

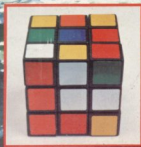
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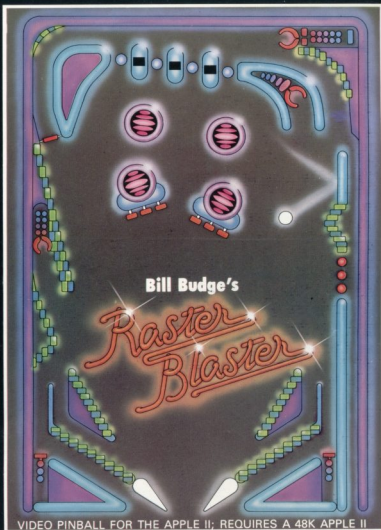


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Cover: Illustration by Tony Gibbons

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NEXT MONTH

WE uncover the seamier of the software business in our January issue. An "X" Certificate is slapped on our review pages as Elspeth Joiner tracks down and gets to grips with a copy of Softporn — one of the new generation of pornographic computer games. Should you be dressing your micro in a plastic mask?

WE take the wraps off the 1981 stocking-fillers this issue but what has Christmas '82 in store? We preview the British Toy & Hobby Fair and its store of electronic wonders the kids will be clamouring for, a year from now.

OUR Treasure Hunt wins top billing in the January games program listings. A fully-fledged adventure for you to key-in. You can tackle a ferocious creature of fantasy in Dragon Druggin' and Sinclair owners will find three 1K wonders for their micros.

THE arcade game which is being tipped as the game to watch in '82. We look at the game which will be filling video screens around the country in Arcade Action. Plus your last chance to bid to be the Best Arcade Game Player in the World and the final three arcade creatures which could help you win a Taito space invaders table of your very own.

ALL this on top of our first look at the computerised Bridge scene, our regular round-up of the latest games and first-class features. Make 1982 a year to remember by starting it off with a copy of Computer & Video Games.

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MAILBAG

MORE LETTERS
on Page 7

PROGRAM TO PUZZLE OVER

Dear Sir

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- ```
10 PRINT "TAKE PENCIL AND
PAPER"
20 PRINT "EXAMINE CARDS.
CALL NUMBERED SIDES 'A'
AND UN-NUMBERED SIDES
'B'."
30 PRINT "STARTING AT ZERO
(TWELVE O'CLOCK)
DEGREES = 1 SUCCESS-
SIVELY NUMBER EACH 45
DEGREES 1 TO 8"
40 PRINT "MATCH AND LIST
MATCHING SYMBOLS. FOR
EXAMPLE 1A1 = 2B2 AND
4A4"
50 PRINT "CONSULT LIST AND
MATCH CARDS"
60 PRINT "1A5 = 2B3, 2B1 = 4A8,
4A6=3A3, 3A1=1A7"
70 REM I THINK THIS PROGRAM
DESERVES A PRIZE FOR
AUDACITY, EVEN IF ITS
ONLY A YEAR'S SUBSCRIP-
TION TO YOUR NEW AND
EXCELLENT (GROVEL,
GROVEL) MAGAZINE.
```

Peter Brown  
West Bridgford  
Nottingham

## A TALE OF TRIAL AND ERROR

To whom it may or may not concern (in other words, to the person who doesn't want to concern him/herself with it, and I don't blame you!).

I wish unhappily to tell you that I have here the solution to November's puzzle. Unfortunately, we (my family) won't have any sort of programmable or semi-programmable computer or T.V. game until Christmas, when we get the Atari T.V. game, and thus, I was not able to think up a suitable program to run on the nearest computer, five miles away in Portadown.

So I tried trial and error, and then I tried maths, and with a little luck stumbled on the solution at roughly 7.30 (I had bought this magazine at 3.30).

What I wish to know is: is it

## GAME FOR A NEW MODEL

Dear Sir,

Firstly, can I congratulate you on a, happily, very different magazine which I think is assured of being a long and lasting success. I have a Tandy TRS-80 Model I and look forward to keying in Tarot when I have the time. However I am thinking of upgrading to the new Model III machine but am waiting to see whether any games software becomes available for it.

Do you know if any software houses are going to specialise in

the Model III Tandy. I have quite a library of Model I discs and would like to build up a similar one for the new machine.

J. Hodgkiss

Harrow

Middlesex

Editor's reply: The best answer here, is that the Model III does have a conversion facility so that Model I discs can be changed to run on the upgraded machine. The technique is well documented in the Model III's TRS DOS manual.



possible to get some sort of wooden spoon? If so, I would like very much for you to send me as much info as you can legally gain from Atari about their T.V. game. But wait for it... in return I will give an honest criticism of YOUR magazine! READY? ... (clever eh?) RUN.

For a start, though I run the risk of being shot, I think your magazine centres too much on the actual games programs.

Secondly, I find only one page for the Bugs, which, I think, are highly entertaining and should be given more room (by the way, the artwork is incredible).

Thirdly, the words, "hardware" and "software" are thrown around like ping-pong balls (what are pseudo random numbers?)

To finish, I think your Basic programming guide is a great help to my classes. I do computers for "O" level but unfortunately, our computers won't arrive until January.

Colin Agnew

Lurgan

Craigavon

Co. Armagh

Editor's reply: To all the many people who wrote in with solutions to our giveaway puzzle: congratulations, you did much better than I did!

But without a computer program to go with them, I'm afraid the fact that you solved the puzzle (I have heard of solution times ranging from 30 seconds to two hours) is not enough to win you a computer — we need a program listing as well.

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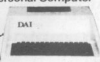
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# MAILBAG

## CITY BOMB BOMBS OUT

Dear Sir,

Having just purchased the first edition of your magazine, I was sorry to find so many faults in your City Bomb program. I have a ZX80 with new RAM and am very new to programming but after much puzzling, I finally got the program to run.

Apart from this I found the magazine very good.

J. Wilson  
Harlow  
Essex

Editor's reply: We were ashamed to discover the mistakes that had crept into the City Bomb listing. We were made to do penance by rushing around answering the many queries about the listing after we appeared in the news-  
agents.

For the record: Part of line 160 went mysteriously missing. It should read:

```
160 IF NOT F = 118 AND F > 0
 THEN GOTO 700
```

A bracket escaped from line 560, it should read:  
560 LET X = INT ((RND\*2) + X)

## CAUGHT IN THE TRAP

Dear Sir,

I've just seen your new *Computer & Video Games*, and on the whole I think it is quite excellent.

Unfortunately you have fallen into the "trap" of those 'zines before you.

You have published nine programs for nine computers, but, who, in the home computer hobby circles, has access to nine computers? I'm sure that with a bit of research it would be possible to produce a page of computer dialects.

I'm not suggesting you do it with every command, just those that have their own dialect.

In addition I suggest a similar thing before each program, giving the alternative POKES for each machine etc.

As hardly anyone has access to nine computers, this would make nine programs accessible to almost everyone, and I'm sure it would put you "head and shoulders" over the other 'zines, who just say: "the POKES have to be changed" — but to what?, and would almost certainly ensure your survival in a competitive field.

I look forward to your Adventure series, especially writing your own.

B. A. Moore  
Bolton  
Lancs

Editor's reply: That is a perfect solution Mr. Moore but I think we would soon run into problems if we tried to produce a table with each of the many computers' special Basic commands. However, we have already adopted your idea in our *Down to Basic* pages, where we are teaching the language with reference to each machine's statements and how to transfer a command from one to another.

## A CHANCE TO REVIEW

Dear Sir,

Thankyou for a marvellous magazine which I thoroughly enjoyed. I would like to contribute to the "mag" myself and wondered if I could offer my services as a reviewer of games on the ZX81 and possibly the Acorn Atom (after Christmas).

I have acted as a reviewer for many of the lesser known games magazines and would welcome the chance to tackle some of the

If you have a comment or idea for *Computer & Video Games* we would like to hear from you.

Please drop us a line at: *Computer & Video Games*, EMAP, Durrant House, 8, Herbel Hill, London EC1R 5JD. While we will respect requests for anonymity, names and addresses must be supplied.

many computer cassettes now out on the market.

I also have a Philips G7000 games centre which I could utilise on your behalf in reviewing their cassettes.

Either way can I wish you all the best for the future of a welcome addition to the magazine world.

T Greener  
Rickmansworth  
Herts

Editor's reply: We have received several letters already from people who would like to help us out with our reviewing of games and TV centre cartridges. We do use outside reviewers and would welcome some additions to our list of helpers, so if you are interested please write and let us know which machines you have access to and we will try to send you some tapes and see what sort of a job you manage. If possible please enclose details of whether you can use disc drives and give us a work and home phone number to allow us to contact you easily. If we get swamped with reviewers for a certain machine then I'm afraid you will be unlucky but until then, we would love to hear from you.



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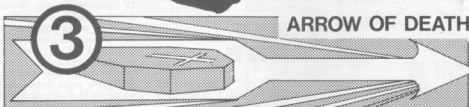
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Do space invaders fight each other to avoid duty on machines which you're playing?

If so, then why let your reputation rest on those cold distant planets inhabited by the green meanies, let your own world into the secret.

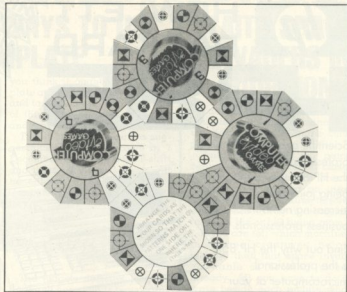
In conjunction with Taito Electronics we are searching for the fastest, deadliest arcade player this side of Alpha Centuri. No matter which game you excel at, you are eligible to enter and it's very easy to do so.

Just turn to the reader reply card, which you will find inside our back cover and fill it in. There are some questions to be answered on what you are looking for in arcade games, so that we can tell the manufacturers and help you to get the kind of games you want.

Next fill in the name of the machine which you have accumulated all that expensively won expertise and take the card down to your local pub, club or arcade. Put the best score you can on the machine and ask the pub or arcade owner to sign it and send it off to us.

Should you find yourself finishing with a score which is not up to your usual standard, simply try again.

If, after you have sent the card in, you manage an even higher score, don't worry, you'll find another card and another chance to enter in our January issue.



## HERE IT IS SOLVED AT LAST!

We will keep a running chart on the scores on the 10 most popular arcade games which will be published in our Arcade Games section to give the rest of you something to aim at.

And the three top scorers on the three most popular machines who send us back their entry forms by 1 January will be invited along to take part in our Grand Arcade Game final.

So if you are the only human still keeping the multifarious hordes of space still locked inside their machines and off the streets of Britain, then let the world know who they owe their thanks to.

Here it is ... the free first issue puzzle as you might have despaired of seeing it, solved!

Although judging by the amount of letters and phone calls we had, many of you have already managed to match the four cards as shown above.

Times for the puzzle ranged from an impossibly "lucky" 30 seconds to a couple of hours slogging through mathematical formulae. Many of you proudly claimed that you produced a solution without the use of a computer.

Our congratulations go out to all of you who managed to do what we in the office couldn't, but I'm afraid that there are still only three VIC-20 computers up for grabs and these will go to the best programs we receive to solve the puzzle.

But it's not too late for you to enter, the closing date is 13 December when all the entries will go forward to be tested against one-another by our judges.

Next issue we will be printing our program solution for those of you who could not work out how to start.

And if you were one of the many who complained that you do not yet have a computer and so were unable to enter, then turn to page 11 where you will find the all-too-easy-to-enter Great Template Competition.

## BRAINWARE ANSWERS

Mercury, Venus and Mars will be the first three planets in line with the sun in our Mind Routines problem. And this astronomical wonder will take place in some 7,341,802.4870886 days (correct to seven decimal places).

The solution to Nevera's Crossword is printed right. We will print the names of the winners next issue.

This month's Brainware problems are on page 20.

|   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|
| T | H | E | B | B | L | E | S | O | R | T |
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| N | O | R | T | H | I | M | I | C | R | O |
| E | O |   | A | C | R | E |   |   |   |   |
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| S | P | A | C | E | I | N | V | A | D | E |





**HEWLETT  
PACKARD**

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**LASKYS** is the largest specialist Hi-Fi chain in Europe, in July 1980 they acquired Microdigital – an independent, specialist microcomputer store based in Liverpool. Since then specialist microcomputer departments have been set up within selected Laskys stores under the Microdigital name, these have now been renamed Microcomputers at **LASKYS**

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# ITION COMPETITION COM

## TEN WINNING WAYS TO USE OUR TEMPLATE

You are now the proud owner of a *Computer & Video Games* free template and are probably wondering just what miracles can be performed with it.

The quick-witted among you will probably already have noticed that the edges on the template are ruler-sharp. Some

you think it ought to be a template at all or who among the rich and famous could make best use of this 8" x 1" piece of plastic and why?

The 10 most imaginative suggestions which we receive by 7 December, will win a Bugs T-shirt and their names and ideas will be entered into the annals of *Computer & Video Games* history.

ENTER THE GREAT TEMPLATE COMPETITION.  
SUPER PRIZES TO BE WON!  
SEE THE COMPETITION PAGE IN THIS ISSUE FOR DETAILS.



of you might possibly have gleaned the information that when it is linked up along the bottom of a C&VG page, it reaches from one edge to the other.

The reasons for this may soon become clear... long ago, when this publication was a barely suppressed gleam in our publisher's eye, he pondered long and hard over the problems of keying in computer listings.

Realising the difficulties of keeping one's place in a long listing, he decided that what the public was crying out for was a tool — a carefully designed precision instrument to help with the keying-in process. He came up with the very template that was attached to your magazine's front cover.

So we want you to use the template to key-in our program listings. You might have come up with some other more imaginative uses for it. This is the essence of the Great Template Competition: we would like to know just what you would like to use our template for, whether

The judge's decision is quite final and her mind is reasonably unworried — it might be worth bearing this in mind.

## COMPETITION RULES

COMPUTER & VIDEO GAMES' many free competitions are open to anyone except EMAP employees and their relatives.

Entries to our Mind Routines, Nevera Crossword, Know Your Creature, Great Template Competition, Game of the Year and Arcade of the World competitions, should be sent to: **COMPUTER & VIDEO GAMES**, Durrant House, 8 Herbal Hill, London EC1R 5JB. Judges' decisions are final and no correspondence can be entered into.

Send entries to Mind Routines on a postcard and in all cases please include a name, address, and where possible, a phone number — so we can let you know should you have won.

## TAITO SPACE INVADERS IN YOUR HOME

A Taito space invaders machine is up for grabs for the winner of the Know your Creatures competition.

Taito Electronics, the name behind the space invaders craze, will make one reader's dream come true — putting an inexhaustible supply of alien terrors, safely locked away in a cocktail table, in his or her living room.

If you can tell which machines the three creatures below inhabit, then that space invaders table is looking closer already. All you have to do is write beside each picture what machine you think that particular creature features in. For example: if the first one looks like a Puckman, Pacman or Mazeman inhabitant, then write any of these words beside it and we will know what you mean.

Then answer the question below, in not more than 25 words and cut out that part of the magazine, but do not post it yet. Put it with the three creatures we featured in our first issue and in our January magazine you will find the last three creatures to complete your set. When you have named all nine, send the three sections back to us.

This gives you time to hunt around your local arcade if there is a creature you are not sure of. The first correct answer out of the hat wins Taito's space invaders table.

And if you missed our first issue, then don't despair as we will be showing them again in that January issue.

## KNOW YOUR CREATURES/2



Name \_\_\_\_\_

Address \_\_\_\_\_

Telephone: \_\_\_\_\_

## I THINK SPACE INVADERS PROVED SO POPULAR BECAUSE:

For details of Computer & Video Games competition rules see page 9.

# NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS N GAMES NEWS



## THE NEW CHESS CHOICE

Chess enthusiasts, who opt for a computerised opponent are having an ever more difficult choice to make.

London based Westrak has a new medium priced chess game (it sells for £100) tempting buyers with a yen for a "full-sized chess board in an attractive brown plastic casing".

The chess board has a sensory surface with lights in each square which show when the computer wants to move. The player has to move its piece into the new position. It means you don't have to enter each move via a keyboard — just like playing a human, except you can set the skill level of your opponent.

Altogether there are 12 different levels, ranging from the learn mode, where the computer will help you along by suggesting a suitable move to make, to good club player standard.

If you make illegal moves the computer will also let you know by flashing its lights at you. Lights also flash when the player's king is in check, and when checkmate is secured it will make another noise.

The game sells under the name Westrak CC1 and is available directly from the firm which is based in North London.

## A RANDOM ADVENTURE

### THE DUNGEONS OF DEATH

Not only a random dungeon but random monsters await the intrepid adventurer who dares the Dungeons of Death.

Ten tortuous levels have to be braved in a 45 minute time limit to win through this graphically displayed adventure.

The adventurer must first barter with the dungeon master for his arrows — magic and the more usual wooden variety — his characteristics are then gener-

ated, he is armed and armoured and then sets off on the quest by loading the first level.

A list of strangely named monsters with a toughness rating in percentage terms is generated and should be memorised if you are not going to end up fighting something deadly after running from a pretty harmless creature.

Treasures are there for the taking to reward the bold adventurer.

## A BETTER BET FOR PUNTERS

### HELTA SKELTA FLATS

Followers of the Turf will find the "Sport of Kings" lovingly reproduced in the horse-breeding and racing game of Helta Skelta Flats.

The aim of the game is to breed horses and then run these thoroughbreds in a race against rival horses, placing bets on them to win money.

It is similar to that popular board game Totopoly and a fascinating concept for the Sinclair ZX81, but in some ways it requires more work with pen and paper than with the keyboard.

The ZX81 acts as a random selector for most of the time, with the information being kept on forms which come with the games package. Two-six players can take part.

Each contestant starts by naming their horse, and the computer allocates various characteristics, for example: good runner or weak legs. This allows the player to enter the information onto the

form card. Once this is done breeding can take place — for a fee. It should be possible for somebody who knows about these things to produce a winner.

Once interbreeding has taken place the race can begin. Odds are calculated by the computer depending on the form of each horse. Bets are also taken, with tote slips also provided in the package. The race is run and the winner collects from the other players.

Our reviewer felt more work needed to be done on the presentation and that some of the paperwork necessary could be incorporated in the available 9K of unused memory. Horse Racing enthusiasts will soon forgive these niggles though.

Helta Skelta Flats comes from London-based Helta Skelta Software and costs £4.

It runs on a ZX81 with 16K RAM pack.

The game is supplied by London-based Sharpsoft for the Sharp MZ-80K and costs £8.25.

Among the other new games from Sharpsoft is a logical, test for people who like a financial challenge. It is called Stockmarket "F" and involves amassing as many stocks and shares of the highest prices as possible.

Stockmarket "F" costs £5.85. VAT and postage are included in both games.

## A FEW POINTS TO MAKE

### RHINO

A sorry fate awaits the computerised figure who walks innocently onto a field in Rhino.

He is faced by an animal of the same name with a hasty temper and a rather intimidating horn.

The creature in question tends to take an instant dislike to anyone invading his field and has a few points to make on the subject.

Luckily there is a wooded area in the field and that is the poor unfortunate's only chance of escape. He must craftily entice the furious rhino into the trees and try to lose him there.

Even if he succeeds, the reward is not a pleasant one — with only a few seconds respite he wanders into another field to find himself with two beasts to lure to a forestry fate!

Rhino comes on a tape with another animal game called Wiggle. This time there is a smaller, but equally dangerous creature to contend with. The player has to guide a snake through the gaps in a set of parallel walls. But once that is mastered the game gets more difficult with the gaps getting more closely spaced.

These two games are for Acorn Atoms with 10K memory and require the floating point ROM. The cassette is priced at £5.00 from Liverpool-based Bug-Byte.

A second new cassette from the firm contains three games: Squares, in which you have to arrange letters in alphabetical order within a square; the musical memory game Simon; and Parachute which involves landing three parachutists on a platform. This also costs £5.00.



## GAMES NEWS

WHERE THE  
ENDS ARE  
REALLY DEAD

## MONSTER MAZE

Finding the way out of a maze is difficult enough without the hazard of man-eating monsters waiting to gobble you up if you cross their paths.

Running on the Commodore VIC-20, *Monster Maze* is an unusual game without a time limit and could be a big seller. The maze unfolds in five square sections as you walk through it, so you cannot see where you are headed — it could be a dead end.

At the beginning of each round a new maze is generated randomly so the player cannot get familiar with a particular one. He controls a man at one end of the maze using a joystick to follow the path moving up, down, right or left. As the player does not know the section he is walking into will be the correct path the game can be frustrating when you keep finding dead ends.

It sounds easy enough but not when a hairy monster is guarding the exit and moves towards you intent on killing you. He is a crafty beast and moves only as the crow flies, so he sometimes walks diagonally and has the nasty habit of hiding in the walls of the labyrinth — lying in wait to take the intrepid explorer unaware.

With each new maze the number of monsters increases, creating more hazards to negotiate. What you can do to thwart them, is lure the creatures away from the exit. You have to be clever to entice him towards you, making sure you can side-step him and quickly make your way to the exit.

Once you have reached round three with three monsters lurking in the maze for the next stage you are given a break with only one monster to contend with. For each round completed you score points.

This is one of the latest games for the VIC specially imported from the States by Adda Computers' VIC Centre. With one other game on the cassette it sells for £14.95.

THE KNIGHT'S  
DAYDAMEL AND THE  
BEAST

The age of chivalry and gallantry returns in the maiden-in-distress game, *Damsel and the Beast*.

The player takes the part of our brave hero, sworn to save the wretched but vociferous damsel who is locked in the bowels of the wicked beast's castle.

A rather tongue-in-cheek adventure, this game sets its hero a randomly generated 35

rooms to search through to complete his task. The damsel must be found by working through these rooms, armed with clubs which can be used either to beat the beast, or smash down obstructing walls.

Only once the hero has slain the beast can he lead his thankful damsel to the exit.

To help light his path our knight is given a number of torches at the outset, which can be used to fend off the beast if he attacks. The tally of the clubs and torches is kept and displayed as each can only be used once.

Bug-Byte is the supplier of this adventure game and it is for use on a ZX81 with 16K RAM pack. The price £6.50.

BOLDLY GOING  
ON THE ZX81

## STARTREK

Captain Kirk and Dr. Spock are ready once again to tackle the baddies of the furthest galaxies — but this time through the auspices of a Sinclair ZX81.

The 16K RAM pack gives ZX81 owners a *Star Trek* game with more details and more facilities. It entails all the usual features of *Star Trek* with the player in control of the *Starship Enterprise*, navigating it and Kirk's crew on a hazardous mission through space.

The Klingons are there in full force too, complete with super-fast firing lasers which the *Enterprise* has to avoid. She can defend herself with the special photon lasers she is equipped with. *Star Trek* costs £5.00 from Bug-Byte of Liverpool.

WORKERS  
STRIKE IN  
ALIEN ACTION

## APPLE PANIC

The space labourer is given a tough test of his workrate in the alien-bashing game of *Apple Panic*.

Any attempt to down tools from this worker of the future, results in death by devouring. The labourer is given a shovel and a network of ladders connecting various levels on the screen.

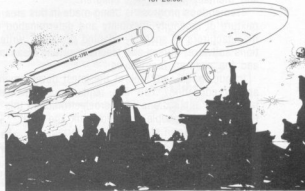
His task is to climb the ladders and dig holes which the Apple aliens will unwittingly fall down and hang from suspended by their feelers. The workman then puts aside all thoughts of tea-break and rushes up to fill in the hole and send the creature plummeting to its death before it can climb to safety.

Five beasts inhabit the first "wall" and these can be killed by a fall of just one level.

The second screenful of creatures include a variety which can only be destroyed by digging two holes, one under the other, and sending him crashing down two levels.

If you succeed in bringing down this second creature, a third — needing a three levels fall to kill it — appears.

There are three lives to start off with, but bonus lives can be gained by the industrious. This time and motion studier's delight is available from Richmond-based SDB software — among others — for £8.95.



# We can all help if we care enough

A  
Special  
from  
Educational  
Computing

Miss Lowe Mrs Crompton  
Miss Thornhill Mr Bates  
Suhaib friend plays games  
goldfish bowl table Kitchen  
Bong McEnroe name shop  
went game ill playing  
excuse



Many people regard computers as some form of man-made monster, heralding the advent of an era where machines are the masters of men. The emergence of microcomputers in the mid-seventies has helped to overcome this misguided view of how computers will affect our lives.

Each month, Educational Computing shows the tremendous advances being made in the enhancement of computers, particularly micros, as teaching aids. In this annual issue, **Learning to cope — computers in special education**, we look at the marvellous achievements of many very dedicated people working with disabled and mentally-handicapped children.

Tremendous progress is being made in this area, brought about by a mixture of ingenuity, flexibility and determination on behalf of the manufacturers of specially-adapted products, writers of applications software, nurses and teachers putting ideas into practice and the children themselves.

In our annual, we look at the latest developments in special education. You can read about the many fascinating applications of microelectronics in this field, what the people involved think and what the future holds in store. Most important of all, you can find if you can help — even in a small way.

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# NEW PRODUCTS NEW PRODUCT NEWS

# GAMESNEWS

## MOORE STARS ON YOUR T.V.

### CONSTELLATION

A computerised rival to celebrity stargazer, Patrick Moore, can guide you through the night sky and its starry wonders.

Constellation is the astronomy aid which will turn your television screen into the night sky — with the help of an Acorn Atom. The view you get on the screen is of the night sky as seen through the revealing lens of a telescope. Using this computerised guide it is possible to look at stars from any point in the northern hemisphere at any chosen time and date.

All the stars that appear on the screen can be shown by magnitude, constellation or number (supplied in a list with the cassette). Make use of the zoom facility to get a good close up of selected stars.

This program was written for a Nascom originally and has only just been converted for use on the Atom. Program Power of Leeds is behind this version which will cost astrology fanatics £7.

Another recent addition to Program Power's Atom list is Mazeball. The player's part in this game is to control a ball which bounces up and down the paths of a maze.

A variety of hazards crop up in your way which must be avoided by bouncing the ball out of their path. Mazeball retails for £4.95.



## REBEL AGAINST AN EMPIRE

### PROJECT NEBULA

The galaxy has been taken over by a force of ruthless, wicked aliens bent on suppressing the inhabitants.

A lone rebel leader with a spaceship is the only means of defence and the only hope of ridding the galaxy of the tyrannical invaders. The player takes control of the rebel and plans his strategy against the alien empire.

Project Nebula is the mission undertaken by the player to free the galaxy. In the Tandy TRS-80 colour computer game, there are

four levels of skill, so the player can work his way through from inexperienced to advanced.

Special features of this new game include checking the fuel supply and refuelling and having to fly a disabled ship, damaged in an exchange of fire. Control is via a joystick.

From the Tandy Corporation Project Nebula costs £24.95, fairly expensive as games go but the new Tandy has colour graphics and the software is most up to date.

## PLUMBING THE 3-D DEPTHS

### SUBMARINE COMMANDER

For sheer atmosphere it is hard to beat a good submarine warfare game and the new one coming out for the Atari home computer has the graphics capabilities to really bring it to life.

Called Submarine Commander, it incorporates 3-D graphics. Realism is brought out with all the dials and gauges found in a real submarine, including: air pressure, oxygen, speed and depth readings.

And that atmospheric bleeping sonar, tracks your own vessel's path with a shadow indicator as well as revealing the presence of other enemy submarines in the area.

You can take the vessel into battle station mode and fire torpedoes at a chosen range and depth.

To add variety and realism to the submarine's simulation, the programmer who wrote the game for Atari has given the player three different views he can survey.

Firstly, there's the picture of the scene below and around the sub., so you can see hazardous objects and possibly creatures which might be lurking in your path. Then, there's the view of the submarine's position in relation to the land, and finally what is in sight when you look through that vital periscope.

This will be out at the end of November from Atari's U.K. distributors Ingersoll Electronics. The cost is £25 and a full review will follow in a future issue.



## GOLD RAID ON THE LABYRINTH

### MINOTAUR

Take a giant step with two hands full of gold and it might take you right into the jaws of a greedy minotaur.

He paces the labyrinths of a deep cavern guarding five valuable bars of gold which lie wrapped up inside a treasure chest. As soon as he senses an extra presence in his lair, he is on the alert and uses his automatic homing device to track down the intruder.

The only thing that will stop him moving towards the intruder are walls blocking his path but he

will home in using a random direction to surprise the intruder.

The adventurer who dares wander into the minotaur's territory is armed with a specially-developed minotaur detector which warns him when the creature is five squares away. The higher the tone given out by the detector the nearer the creature is, warning the intrepid explorer to take evasive action.

Like any human the explorer can only carry two bars at once so he has to keep making trips back and forth until all five are

securely locked up in the wall safe.

Minotaur runs on an Acorn Atom requires 5K with 6K graphics. It is the latest pack out of Acorn's software arm of Acornsoft.

Two other games are on the cassette, a version of the popular arcade game Puckman called Snapper, and a sadistic but compulsive game, Babies. The player must catch babies who are leaping for their lives from the top of a burning building. If the trampoline misses three babies, it marks the end of the game. It costs £10 plus V.A.T.



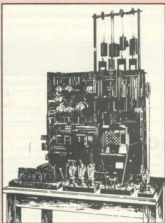
# CHESS



AFTER the hoax perpetrated in the mid 18th century by Von Kempelen's Chess-playing "automaton", the world had to wait until the end of the 19th Century for the genuine article.

The Spaniard, Leonardo Torres y Quevedo (1852-1936) was an early pioneer of dataprocessing and a prolific inventor. He built an electro-mechanical device to play the basic endgame of King and Rook against King.

The machine, which appeared in the 1890s, always played White (the stronger side) and



invariably forced checkmate, although frequently not in the smallest number of moves necessary.

Torres' principle motive for building the machine, was to disprove the argument that automation could never be used for tasks which required the "intervention of the mental faculties".

## By Max Bramer

In 1975, Donald Michie, Professor of Machine Intelligence at the University of Edinburgh, published a reconstruction of Torres' algorithm in modern "decision table" form.

Michie states that in the worst case, it can take 62 moves for White to win (compared with a "theoretical" maximum of 16 needed from any starting position). White's play is painfully slow and tedious, as the reader will soon discover by choosing one or two starting positions and following through a "Torres strategy" for White in each one.

Producing an efficient algorithm remotely comparable to that of Torres in terms of compactness took almost 90 years further to achieve. The machine is now housed in the museum of the Polytechnic in Madrid.

Delegates at a conference on *Advances in Computer Chess* at Imperial College, London, in April were fascinated by a description by Ken Thompson (of Bell Laboratories) of his special-purpose chess machine named Belle.

Belle is an almost frightening example of the power of micro-chip technology. It can generate a candidate move for consideration in just over one two-millionth of a second and examines 160,000 positions per second. It uses a pre-stored opening "book" with 300,000 positions, compared with an estimated 200,000 positions in each volume of the *Encyclopedia of Chess Openings*. The entire book

is scanned in one and a half seconds!

The speed with which this machine was developed is also incredible. The first "light" design was in February 1980, when the components (approximately 1,700 chips) were ordered. It played its first move in July, won a celebrated simultaneous game with Pfleger in Hamburg in August, won the third World Computer Chess Championship in Linz last autumn with a score of 4½/5 and has won several human tournaments since then.

Belle now has an official E.L.O. rating of 2140 and could well go much higher.

To dispel any feelings of over-confidence about the "state-of-the-art" of computer chess in the 1980s, here are the first few moves of two games from last years' first world microcomputer championship in London.

Black on both occasions was the aptly-named program, Albatross:

1. P-Q4, P-K3; 2. N-KB3, P-Q4;  
3. N-B3, B-K2; 4. B-B4, Q-Q3??  
1. P-Q4, P-K3; 2. N-KB3, P-Q4;  
3. N-B3, B-K2; 4. P-K4, PXP;  
5. NXP, Q-Q4; 6. N-B3, N-QB3??

I shall return to the subject of computer blunders next month.

Here is one of its recent games, an excellent win against a senior U.S. master, Mike Valvo.

**White M. Valvo Black Belle**  
3.P-QN3, P-KN3; 4.B-N2, B-N2;  
5.P-N3, O-O; 6.B-N2, N-B3;  
7.O-O, P-N3; 8.P-K3, B-N2;  
9.Q-K2, P-K3; 10. P-Q3, P-Q4;  
11.QN-Q2, P-Q5; 12.P-K4, P-K4;  
13.N-R4, B-KR3; 14.P-KB4? PXP;  
15.PXP, N-R4; 16.Q-N4, BXP;  
17.RXB? N-K4; 18.Resigns

White loses the Rook and is then the exchange and a Pawn down in a hopeless position.

White's 13th move is dubious but Black's combination is surprising, and clearly foreseen on his 13th move (or 13... B-KR3 is inexplicable). After 15... N-R4, White cannot avoid losing material.

| The black king                                                        |                                                                                                      |                                                                    |                                                                                            |                                                        |                                |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------|
| is in the same zone as the rook                                       | is not in the same zone as the rook and the vertical distance between the black king and the rook is |                                                                    |                                                                                            |                                                        |                                |
|                                                                       | more than one square                                                                                 | one square, with the vertical distance between the two kings being |                                                                                            |                                                        |                                |
| The rook moves away horizontally (to the rook file of the other zone) | The rook moves down one square                                                                       | more than two squares                                              | two squares, with the number of squares representing their horizontal distance apart being |                                                        |                                |
|                                                                       |                                                                                                      | The king moves down one square                                     | odd                                                                                        | even                                                   | zero                           |
| 1                                                                     | 2                                                                                                    | 3                                                                  | The rook moves one square horizontally                                                     | The white king moves one square towards the black king | The rook moves down one square |
|                                                                       |                                                                                                      |                                                                    | 4                                                                                          | 5                                                      | 6                              |

Torres' algorithm, which divided the board into three zones of 3, 2 and 3 ranks.

# Acorn Atom 747



## FLIGHT SIMULATION PROGRAM FOR THE 12K ATOM

Written for Bug-byte by a 747 pilot. Accurate simulation of a 747's cockpit display (airspeed, altitude, rate of climb, attitude, flaps, etc.), and graphic display of horizontal situation and attitude; allows you to guide your craft to the landing strip. On making your final approach the display changes to a high-resolution 3D representation of the runway coming up to meet you. A real test of skill. Finding the runway is quite a challenge — landing safely is even more difficult. If you succeed, you are awarded a skill rating and the chance to take off and try again.

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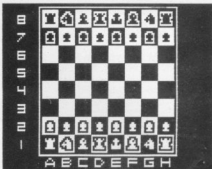
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# Sinclair ZX81

**ZXAS MACHINE CODE ASSEMBLER** Although many people have expressed disbelief, we assure you that this is a full-specification 280 assembler. Standard mnemonics are written directly into your BASIC program. Code be assembled anywhere in memory. Handles labels. FOR 16K ZX81 & 8K ROM ZX80 — **A GIVEAWAY AT ONLY £3.95**

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**MULTIFILE** A multi-purpose menu-driven filing system supplied on cassette, together with 3 blank data cassettes and comprehensive documentation describing many applications. FOR 16K ZX81 & 8K ROM ZX80 — **NOW ONLY £12.50**

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**STARTREK** for 16K ZX81. All the usual features; 9 levels of play **ONLY £5.00**

**THE DAMSEL AND THE BEAST** A fantastic adventure game for the 16K ZX81 — one of the best 16K games available **ONLY £6.50**

## PROGRAM PACK 6 for the 16K ZX81 & 8K ROM ZX80

Two programs for the expanded ZX81 to keep you entertained for hours! 3-D OXO is written in machine code, and is hard to beat. The other is a compulsive adventure game called MARS RESCUE.

**BOTH PROGRAMS FOR ONLY £4.50**

## BREAKOUT

This cassette contains two versions of the popular arcade game, both written in machine code and both fitting into the 1K ZX81. Flicker-free fast moving graphics.

**BOTH GAMES FOR ONLY £3.50**

## SOFTWARE

## GO

### By Allan Scarff

GO affords many levels of programming challenge, from the very simple to the ultimate challenge — an intelligent program. It is possible to develop your Go program one step at a time, each step giving a useful program.

The first step is to use your V.D.U. screen as a board. The simple elements of the grid and circles for stones are relatively easy to represent.

Secondly, build in game recording and playback. No Go player should be without such a program! It can do for Go what video recording did for sport. You can relive your triumphs and catastrophes. You can analyse in slow motion the critical points, perceive the sweep of events by fast replay, even obtain an entirely different perspective by reversing the playback.

And all at the push of a button!

Next you should build in the rules of Go. Two novice players can then play without fear of inadvertent illegal moves. Captured stones should disappear automatically and illegal moves should be firmly rejected (with appropriate sound effects!)

Now you can include an evaluation routine to count territory not only when play has finished (enabling the program to announce the winner) but also during the game. The difficult part is getting the program to decide sensibly where the individual areas are, before they are completely formed.

The above four steps bring your Go program to the brink of taking on an active role as a player. Avoiding the distractions of adding more facilities for archiving, displaying and evaluating the game of Go, the next step is to include a crude move generator. One method is to use a random number generating routine to provide candidate moves. If the move turns out to be legal and does not decrease the computer's score (as determined by the ter-

GO is the most popular board game in the world. If you haven't heard of it, that's because most Go is played in China, Japan and Korea. But Go is coming west fast.

In the UK, Go has found popularity with computer professionals, but it is the advent of the personal computer which offers the greatest opportunity to develop computer Go. Perhaps there already exist hundreds of Go programs? (If so, please write and tell me about yours!)

Go is, in essence, a very simple game. The playing pieces, called "stones", are black for one player and white for his/her opponent. Play consists of the contestants placing, in turns, a single stone on the intersections of a 19 x 19 grid. Each player attempts to surround territory; first sketching it out, then fighting to hold it and capture his opponent's areas, until the boundaries are completed. The winner is the contestant with the most territory and captive stones combined.

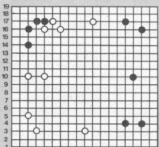
Go originated in China over 4,000 years ago, perhaps as a primitive abacus, but more likely as a method of divination. The board can represent the universe, the black and white stones the two universal elements, negative and positive, or yin and yang. In Japan as well as China, Go became very popular amongst warriors. It proved ideal for devising military tactics. Indeed, in more recent times the Vietcong included Go in their military training for officers (some would say to devastating effect!)

Its simple rules allow Go to be

ritory evaluation routine), the program should accept the move. If not, it should generate another. Your program will now play Go . . . very, very badly! However, this in itself is valuable for a beginner — we all like to beat somebody! It's also interesting to see by how much you can win.

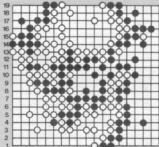
Improving the play of your Go program provides a fascinating study into the concepts of both Go and programming. Unlike Chess, nobody has ever been able to write a Go program that plays really well. What takes

played in a simple fashion almost like the children's game, "boxes". Part of its charm is that in these circumstances the outcome is by no means predictable. But the game can be played at many levels of skill. At the higher levels, Go is revealed as the most subtle and profound board game of them all (including that modern upstart, Chess!).



A B C D E F G H J K L M N O P Q R S T

The players have sketched out areas around the edges of the board.



A B C D E F G H J K L M N O P Q R S T

At completion: the two players held onto their areas but black gained more territory than white (opponent stones behind enemy lines are captive).

the machine an hour to calculate in Chess, would take a millennia in Go. There are just too many possibilities. Advances in programming Go will inevitably rely on new ideas, not on massive computing power. The micro is as suited to this task as the largest machine. Thus micro Go provides the ultimate programming challenge.

● Allan Scarff's next article, which explains the rules of Go and the first steps to "Micro" Go, will appear in our March issue. Next month Alan Hiron looks at programming Bridge.



# Brainwave

## MIND ROUTINES

A man's wife normally drives to the station to meet her husband on the 5 p.m. train.

Her average speed in m.p.h., the time in minutes for her journey and the distance in miles from her home to the station are all whole numbers. (Her speed exceeds 15 m.p.h. but never 60 m.p.h.)

The train is early, however, it arrives at exactly the same time the wife is leaving home.

Since it has gone 5 o'clock the man starts walking at 3 m.p.h. towards home.

He meets his wife on the way and they eventually get home at an exact number of minutes to 6 o'clock.

The number of minutes the train was early is not an exact



multiple of the number of minutes they were home early.

- (1) How early was the train?
- (2) And how far away did she live?

## WIN OUR CHAMPAGNE

Two bottles of champagne are up for grabs on this page every month. The first correct answers out of the hat for both the Mind Routines problem and the crossword on 15 December will have bottles of champagne rushed to them. Ian Pedder's Mind Routines problem will test both your ability to think through a puzzle and set it out as a program. These lend themselves to solving by program. If you are more literary minded try Nevera's Crossword and see how you get on.

See page 9 for the solutions to the first issue's puzzle and crossword.

● For details of Computer & Video Games competition rules see page 11.

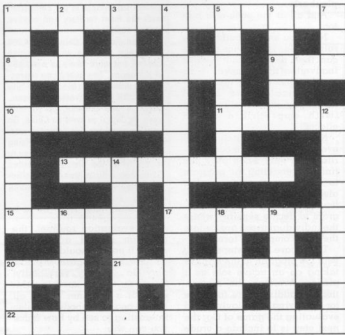
## NEVERA CROSSWORD

### Across

1. Do they keep 19's player's trousers up? (8, 5)
8. A micro often does when a sum is late. (9)
9. Basic function of the sun. (3)
10. Management Information System user of poor quality. (7)
11. Round number. (3, 2)
12. I'm put off the cuff around the PROM. (9)
15. 2 killed by Video. (5)
17. Allay on apple case statement by removing 150 characters. (7)
20. The number system Capone left last month. (3)
21. A set theoreticians level of pay. (5, 4)
22. Just the number for a bubble sort. (8, 5)

### Down

1. Language maker. (9)
2. Basic star. (5)
3. Commands the syntax of a programming language. (5)
4. Mathematical Insertion into plate iron. (13)
5. End of the line from the micro. (3, 4)
6. Game in which to plot together. (5)
7. Evil Function. (3)
12. Step for a king in the hard stuff. (9)
14. Hardware result of 4. (7)
16. Non-alphanumeric character as above. (5)
18. Shut away the plotter won't



- draw with this. (3, 2)
19. A seaman — one who became a micro manufacturer. (5)
20. There's nothing loud when the machine's in this state. (3)

# Make the most of your Sinclair ZX Computer...

# Sinclair ZX software on cassette.

## £3.<sup>95</sup> per cassette.

The unprecedented popularity of the ZX Series of Sinclair Personal Computers has generated a large volume of programs written by users.

Sinclair has undertaken to publish the most elegant of these on pre-recorded cassettes. Each program is carefully vetted for interest and quality, and then grouped with other programs to form a single-subject cassette.

Each cassette costs £3.95 (including VAT and p&p) and comes complete with full instructions.

Although primarily designed for the Sinclair ZX81, many of the cassettes are suitable for running on a Sinclair ZX80 - if fitted with a replacement 8K BASIC ROM.

Some of the more elaborate programs can be run only on a Sinclair ZX Personal Computer augmented by a 16K-byte add-on RAM pack.

This RAM pack and the replacement ROM are described below. And the description of each cassette makes it clear what hardware is required.

### 8K BASIC ROM

The 8K BASIC ROM used in the ZX81 is available to ZX80 owners as a drop-in replacement chip.

With the exception of animated graphics, all the advanced features of the ZX81 are now available on a ZX80 - including the ability to run much of the Sinclair ZX Software.

The ROM chip comes with a new keyboard template, which can be overlaid on the existing keyboard in minutes, and a new operating manual.

### 16K-BYTE RAM pack

The 16K-byte RAM pack provides 16-times more memory in one complete module. Compatible with the ZX81 and the ZX80, it can be used for program storage or as a database.

The RAM pack simply plugs into the existing expansion port on the rear of a Sinclair ZX Personal Computer.



### Cassette 1 - Games

For ZX81 (and ZX80 with 8K BASIC ROM)

**ORBIT** - your space craft's mission is to pick up a very valuable cargo that's in orbit around a star.

**SNIPER** - you're surrounded by 40 of the enemy. How quickly can you spot and shoot them when they appear?

**METEORS** - your starship is cruising through space when you meet a meteor storm. How long can you dodge the deadly danger?

**LIFE** - J.H. Conway's 'Game of Life' has achieved tremendous popularity in the computing world. Study the life, death and evolution patterns of cells.

**WOLFPACK** - your naval destroyer is on a submarine hunt. The depth charges are armed, but must be fired with precision.

**GOLF** - what's your handicap? It's a tricky course but you control the strength of your shots.

### Cassette 2 - Junior Education: 7-11-year-olds

For ZX81 with 16K RAM pack

**CRASH** - simple addition - with the added attraction of a car crash if you get it wrong.

**MULTIPLY** - long multiplication with five levels of difficulty. If the answer's wrong - the solution is explained.

**TRAIN** - multiplication tests against the computer. The winner's train reaches the station first.

**FRACTIONS** - fractions explained at three levels of difficulty. A ten-question test completes the program.

**ADDSUB** - addition and subtraction with three levels of difficulty. Again, wrong answers are followed by an explanation.

**DIVISION** - with five levels of difficulty. Mistakes are explained graphically, and a running score is displayed.

**SPELLING** - up to 500 words over five levels of difficulty. You can even change the words yourself.

### Cassette 3 - Business and Household

For ZX81 (and ZX80 with 8K BASIC ROM) with 16K RAM pack

**TELEPHONE** - set up your own computerised telephone directory and address book. Changes, additions and deletions of up to 50 entries are easy.

**NOTE PAD** - a powerful, easy-to-run system for storing and

retrieving everyday information.

Use it as a diary, a catalogue, a reminder system, or a directory.

**BANK ACCOUNT** - a sophisticated financial recording system with comprehensive documentation. Use it at home to keep track of where the money goes, and at work for expenses, departmental budgets, etc.

### Cassette 4 - Games

For ZX81 (and ZX80 with 8K BASIC ROM)

**LUNAR LANDING** - bring the lunar module down from orbit to a soft landing. You control attitude and orbital direction - but watch the fuel gauge! The screen displays your flight status - digitally and graphically.

**TWENTYONE** - a dice version of Blackjack.

**COMBAT** - you're on a suicide space mission. You have only 12 missiles but the aliens have unlimited strength. Can you take 12 of them with you?

**SUBS TRIKE** - on patrol, your frigate detects a pack of 10 enemy subs. Can you depth-charge them before they torpedo you?

**CODEBREAKER** - the computer thinks of a 4-digit number which you have to guess in up to 10 tries. The logical approach is best!

**MAYDAY** - in answer to a distress call, you're narrowed down the search area to 343 cubic kilometers of deep space. Can you find the astronaut before his life-support system fails in 10 hours time?

### Cassette 5 - Junior Education: 9-11-year-olds

For ZX81 (and ZX80 with 8K BASIC ROM)

**MATHS** - tests arithmetic with three levels of difficulty, and gives your score out of 10.

**BALANCE** - tests understanding of levers/fulcrum theory with a series of graphic examples.

**VOLUMES** - 'yes' or 'no' answers from the computer to a series of cube volume calculations.

**AVERAGES** - what's the average height of your class? The average shoe size of your family? The average pocket money of your friends? The computer plots a bar chart, and distinguishes MEAN from MEDIAN.

**BASES** - convert from decimal (base 10) to other bases of your choice in the range 2 to 9.

**TEMP** - Volumes, temperatures - and their combinations.

### How to order

Simply use the order form below, and either enclose a cheque or give us the number of your Access, Barclaycard or Trustcard account. Please allow 28 days for delivery. 14-day money-back option.

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Sinclair Research Ltd,  
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Please send me the items I have indicated below.

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| Qty | Code | Item                                | Item price | Total |
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|     | 21   | Cassette 1 - Games                  | £3.95      |       |
|     | 22   | Cassette 2 - Junior Education       | £3.95      |       |
|     | 23   | Cassette 3 - Business and Household | £3.95      |       |
|     | 24   | Cassette 4 - Games                  | £3.95      |       |
|     | 25   | Cassette 5 - Junior Education       | £3.95      |       |
|     | 17   | *8K BASIC ROM for ZX80              | £19.95     |       |
|     | 18   | *16K RAM pack for ZX81 and ZX80     | £49.95     |       |
|     |      | *Post and packing (if applicable)   | £2.95      |       |
|     |      |                                     | Total £    |       |

\*Please add £2.95 to total order value only if ordering ROM and/or RAM.

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# Sinclair ZX81 Personal Computer

## the heart of a system that grows with you.

1980 saw a genuine breakthrough – the Sinclair ZX80, world's first complete personal computer for under £100. Not surprisingly, over 50,000 were sold.

In March 1981, the Sinclair lead increased dramatically. For just £69.95 the Sinclair ZX81 offers even more advanced facilities at an even lower price. Initially, even we were surprised by the demand – over 50,000 in the first 3 months!

Today, the Sinclair ZX81 is the heart of a computer system. You can add 16-times more memory with the ZX RAM pack. The ZX Printer offers an unbeatable combination of performance and price. And the ZX Software library is growing every day.

### Lower price: higher capability

With the ZX81, it's still very simple to teach yourself computing, but the ZX81 packs even greater working capability than the ZX80.

It uses the same micro-processor, but incorporates a new, more powerful 8K BASIC ROM – the 'trained intelligence' of the computer. This chip works in decimals, handles logs and trig, allows you to plot graphs, and builds up animated displays.

And the ZX81 incorporates other operation refinements – the facility to load and save named programs on cassette, for example, and to drive the new ZX Printer.

## Kit: £49.<sup>95</sup>

### Higher specification, lower price – how's it done?

Quite simply, by design. The ZX80 reduced the chips in a working computer from 40 or so, to 21. The ZX81 reduces the 21 to 4!

The secret lies in a totally new master chip. Designed by Sinclair and custom-built in Britain, this unique chip replaces 18 chips from the ZX80!

### New, improved specification

● Z80A micro-processor – new faster version of the famous Z80 chip, widely recognised as the best ever made.

● Unique 'one-touch' key word entry: the ZX81 eliminates a great deal of tiresome typing. Key words (RUN, LIST, PRINT, etc.) have their own single-key entry.

● Unique syntax-check and report codes identify programming errors immediately.

● Full range of mathematical and scientific functions accurate to eight decimal places.

● Graph-drawing and animated-display facilities.

● Multi-dimensional string and numerical arrays.

● Up to 26 FOR/NEXT loops.

● Randomise function – useful for games as well as serious applications.

● Cassette LOAD and SAVE with named programs.

● 1K-byte RAM expandable to 16K bytes with Sinclair RAM pack.

● Able to drive the new Sinclair printer.

● Advanced 4-chip design: micro-processor, ROM, RAM, plus master chip – unique, custom-built chip replacing 18 ZX80 chips.



## Built: £69.<sup>95</sup>

### Kit or built – it's up to you!

You'll be surprised how easy the ZX81 kit is to build: just four chips to assemble (plus, of course the other discrete components) – a few hours' work with a fine-tipped soldering iron. And you may already have a suitable mains adaptor – 600 mA at 9 VDC nominal unregulated (supplied with built version).

Kit and built versions come complete with all leads to connect to your TV (colour or black and white) and cassette recorder.



Every ZX81 comes with a comprehensive, specially-written manual – a complete course in BASIC programming, from first principles to complex programs.



# puter-



## 16K-byte RAM pack for massive add-on memory.

Designed as a complete module to fit your Sinclair ZX80 or ZX81, the RAM pack simply plugs into the existing expansion port at the rear of the computer to multiply your data/program storage by 16!

Use it for long and complex programs or as a personal database. Yet it costs as little as half the price of competitive additional memory.

With the RAM pack, you can also run some of the more sophisticated ZX Software – the Business & Household management systems for example.

## Available now- the ZX Printer for only £49.<sup>95</sup>

Designed exclusively for use with the ZX81 (and ZX80 with 8K BASIC ROM), the printer offers full alpha-numerics and highly sophisticated graphics.

A special feature is COPY, which prints out exactly what is on the whole TV screen without the need for further instructions.

### How to order your ZX81

BY PHONE – Access, Barclaycard or Trustcard holders can call

01-200 0200 for personal attention 24 hours a day, every day.

BY FREEPOST – use the no-stamp-needed coupon below. You can pay

At last you can have a hard copy of your program listings – particularly useful when writing or editing programs.

And of course you can print out your results for permanent records or sending to a friend.

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZXPrinter connects to the rear of your computer – using a stackable connector so you can plug in a RAM pack as well. A roll of paper (65 ft long x 4 in wide) is supplied, along with full instructions.

by cheque, postal order, Access, Barclaycard or Trustcard. EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research Ltd, FREEPOST 7, Cambridge, CB2 1YY.

| Qty | Item                                                                                                    | Code | Item price<br>£ | Order<br>Total<br>£ |
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|     | Sinclair ZX81 Personal Computer kit(s). Price includes ZX81 BASIC manual, excludes mains adaptor.       | 12   | 49.95           |                     |
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|     | Mains Adaptor(s) (600 mA at 9 V DC nominal unregulated).                                                | 10   | 8.95            |                     |
|     | 16K-BYTE RAM pack.                                                                                      | 18   | 49.95           |                     |
|     | Sinclair ZX Printer.                                                                                    | 27   | 49.95           |                     |
|     | 8K BASIC ROM to fit ZX80.                                                                               | 17   | 19.95           |                     |
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Tel: (0276) 66104 & 21282.

# TV GAMES CENTRES TV GAMES CENTRES TV GAMES CENTRES VIDEO SCREEN

## SHOOT-OUT, CHESS AND DRAUGHTS

Perfect your marksmanship in a shoot out to the death in the desert sands of the wild west.

That's the theme of one of the new games for the Acetronic MPU1000 home video games centre. Either play against the computer or take on a friend or foe in this captivating game called Shoot Out.

The tension and excitement of those lawless days of gunfights are all there for £14.95. You take

the part of one of the cowboys on the screen, who is in a gunfight and must save his skin by being quick off the draw.

Two other additions for the Acetronic range include chess and draughts which follow the format of traditional computerised games and sell for the same price as Shoot Out. Chess and draughts are available direct from Ace or through the firm's distributors in the UK.



There's no time to hang around in the sport of Drag Racing and if you like your thrills short and sharp, you should enjoy the new television version.

When the game is mastered, a race can take as little as six to seven seconds — and from then on it's just a question of how many 0.1s of a second you can shave off your best time.

Mastering this cartridge is a real test of reactions and understanding. Two cars wait on a screen, revving away as the starter counts down from 10. As he reaches "one" it's both fingers on the accelerator button and a swift change into first gear, second, third and fourth, follow

## NO TIME TO HANG AROUND

swiftly with perfect changes taking place that split second before the red revs line moves into blow-out mode.

It can make frustrating learning as itchy fingers push too early or too long in the search for a good time. The sound effects are convincing but the graphics are all too ordinary and capture none of the thrills and colour of the real thing.

The cartridge is produced for the Atari by US firm Activision and distributed over here by Computer Games for £16.95.

Also new out from Activision is Laser Blast, the game which

## WHAT A GRAPHIC KNOCK-OUT

### BOXING

Landing a K.O. blow in the boxing ring is an exhilaration few of us will ever know but it is possible to relive some of the cut-and-thrust of the sport in the new Intellivision cartridge.

Boxing is now added to the long list of Intellivision sports cartridges which show off the machine's graphic qualities to best effect.

It's "seconds out" as you control one of the boxers fighting for survival in a tournament match. A clock on the platform stage in the righthand section of the screen ticks off the seconds of each round and the entire picture is dealt with in the usual perspective.

As with most of the Intellivision games arms and legs bend in the right places so the figures appear to be really moving and not as if they are suffering from a severe case of arthritis of the joints.

Points are scored for every blow each of the players strike



and penalties given for below-the-belt punches. The winner is the player with the most points at the end of a bout or a win from a knock-out.

Boxing is available from the Intellivision Major League Sports Network range through UK distributors Ace (Advanced Consumer Electronics) of Wembley. Its retail price is marked at £18.95.

Space Armada is of the space invader version for the Intellivision. It has 'some graphically interesting aliens and costs £18.95. Otherwise the tactics are in the time-honoured tradition.

## DRAG RACING AND LASER BLAST

reverses the usual alien descending from the heavens role.

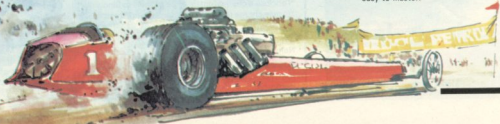
Satisfyingly brilliant laser flashes illuminate the night sky as you guide your fleet of flying saucers over the planet's defences.

The defences come in threes. They roll along the ground beneath your ships and home in swiftly with their deadly fire.

Shots from your own saucer are just as lethal as you soar above the ground forces — unfortunately, at just the height

to give them the best chance of hitting you. When all three laser stations have been destroyed, the next three roll on to the screen. You have just three reserves to call on but have the additional advantage of being able to pilot your wrecked ship on to the defenders. Further reinforcements are available with each score of 10,000 and after some initial low scores, a dedicated player can reach this score for the loss of each life — and so keep going ad-infinitum.

Four skill levels and an asking price of £16.95 but perhaps too easy to master.







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bleepers (£13 each) this facility can be extended to colleagues and members of the family. Using a £3.50 standard cassette you can record as many as 45 messages. The announcement can be up to 16 seconds long and the incoming message up to 30 seconds long. The machine is easy to install and comes with full instructions. It is easily varied to your own home with the speed control. It is provided with an answering facility which can be provided to play into a jack socket. Most important of all is the fact that it is fully POST OFFICE APPROVED. The price of £126 (inc. VAT) includes the machine, an extra light remote call-in bleeper, the microphone message tape, A.C. mains adapter. The unit is 9 1/2" x 4 1/2" x 2 1/2" and is fully guaranteed for 12 months. The telephone can be placed directly on the unit - no additional desk locker is required. **£135** (inc. VAT)

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# Adventure

SCOTT Adams is the name behind a whole library of Adventures and his games have introduced many enthusiasts to micro adventuring. My own introduction was his Adventureland on a friend's machine. It is set in a swampy forest near a sunny meadow and progresses underground to a maze of pits.

Various things lying about the place seem rather innocuous, but as the game develops a feeling grows that most objects have a purpose, and that some very devious thinking will be needed to find uses for, among other things, an empty wine bladder and patches of oily slime! The large dragon, peacefully sleeping in the meadow, begs a good hard kick to wake him up — is he really as impervious to attack as he seems? And the "No Swimming" sign by the lake is positively urging you to take a dip — but with what consequences? The object of the game is to collect and store 13 treasures. To say more would be to give away too much.

So I'll merely say "Bunyon" and vibrate on to another Scott Adams' game — Pirate Adventure. A strong theme runs through this game which is littered with bottles of rum, treasure chests, anchors and a parrot, which is not only excessively greedy but very loquacious.

The story begins in the player's London flat, from where, after some chilling discoveries, it moves to Pirate Island. There it soon becomes apparent that you are being urged to do something without being told quite what.

Pirate is not as deep as Adventureland and the machine's memory is not so fully packed. But this is more than offset by a delightful sense of humour running through the game, climaxed by a cruel and dramatic hoax.

Both these games are available on the 16K TRS-80 and Video Genie; the 16K Exidy Sorcerer; 24K Apple 2 and Apple 2 Plus.

The Adventure series by Scott Adams, currently comprises 10

A swift glance down most software catalogues will reveal a veritable hoard of Adventure games.

They compete with Space Invader and Asteroid type games for the top-of-the-micro-pops. Which you prefer depends on whether you like to test your reactions and control, or are the mystery-loving puzzle-solver type (these are by no means mutually exclusive).

If you are new to Adventure and wondering which to try first, or if you are just wondering which to buy next, I will be helping to guide you through the Adventure jungle each issue. A brief rundown of what to expect from each Adventure, will help you select tapes and discs to suit your taste a little less randomly.

games. All games are written in machine code and have a "save game" feature enabling the current state of the game to be recorded and reloaded later.

Each month I shall be bringing you tips on how to write an Adventure program in Basic. In order to do this you will require a machine with at least 8K RAM and capable of holding many string variables, arrays (single dimension will do). It will also need string manipulation statements like: MID\$, LEFT\$, RIGHT\$, LEN, plus the ability to concatenate.

Having devised your plot and drawn a map the next step is to number the locations from zero, and draw up a table. For simplicity I have shown a five location map in Figure 1 and the corresponding table in Figure 2. All exits in the example are compass bearings, hence the exit column entry for location 0 shows "ES"—(East South) leading to destinations in the corresponding positions of the destination column entry, of locations 1 and 2 respectively. If more than 10 locations were to be used, double figures would be needed in the destination column.

Type the contents of the table, omitting the number column, row by row into data statements. Part of your program will now look like this:

```
DIM LS(4), ES(4), DS(4)
```

```
For I=0 To 4: READ
LS(I), ES(I), DS(I): NEXT
DATA COTTAGE, ES, 12, LANE,
WS, 03, FOREST...
and your logical network is
formed!
```

Putting aside sophisticated word decoding routines for the moment, we can test this network out with the following simple routine:

```
150 (clear screen): LN=1: REM
CURRENT LOCATION IS 1
160 PRINT "I AM IN A ": LS(LN)
170 INPUT "WHERE TO NOW":
RS (clear screen): REM ANSWER N, S, E or W
180 RS=LEFT$(RS, 1)
190 FOR I=1 TO LEN(ES(LN))
200 IF MID$(ES=VAL(MID$(
(DS(LN), I, 1)): GOTO 160
210 NEXT
220 PRINT "I CAN'T GO THERE":
GOTO 160
```

To place objects in these locations is now quite easy. Make an object table as in Figure 3 using array P to hold the current location of each object. Read this in from data statements as with the locations. Now add these lines to those above, and Hey Presto!

```
165 OS$="I CAN SEE": FOR I=0
to 3
166 IF P(I)=LN THEN OS$ =
OS$+OS(I)
167 NEXT: PRINT OS$
```

We can't manipulate the objects yet — that will come after we've had a look at word decoding next month.

Fig. 1: Simplified network of locations showing initial positions of objects in brackets. Note: objects and locations independently numbered.

| No. | Location<br>(Array LS (4)) | Exits<br>ES (4) | Destination<br>DS (4) |
|-----|----------------------------|-----------------|-----------------------|
| 0   | Cottage                    | ES              | 12                    |
| 1   | Lane                       | WS              | 03                    |
| 2   | Forest                     | NE              | 03                    |
| 3   | Meadow                     | NWS             | 124                   |
| 4   | Lake                       | N               | 3                     |

Fig. 2: Location table derived from map in Fig. 1. The number column is the array subscript used to access the information on a given line. Note all variables are character (string).

| No. | Object<br>Array OS (3) | Place<br>P(3) |
|-----|------------------------|---------------|
| 0   | Knife                  | 0             |
| 1   | Fish                   | 4             |
| 2   | Cow                    | 3             |
| 3   | Axe                    | 2             |

Fig. 3: Object table derived from map in Fig. 1. Again the number column is the array subscript. Note that since array P will only hold the number of the current location of an object it may be defined as integer numeric.

## TIPS

When the blown up asteroid sent out three arrow-head missiles on that first revenge mission, many players decided that *Asteroids de Luxe* was too hot for them.

A pity, because good use of the faster firing and moving advantages of the second generation *Asteroids* game, could still ensure a long play. And the new features make for a more entertaining play, than that offered by its popular predecessor. Here we tell the uninitiated what to expect from *Asteroids de Luxe* and offer a few hints on survival.

The first difference from the original game is that there are more meteors on the first screen, seven instead of four. But you will soon find that the faster firing button — it is possible to fire almost continuously — makes for more dramatic destruction.

This fire-power makes it easy to stand your ground when meteors are heading straight for you, as you should reduce them to smithereens before they become a real danger.

There is also the question of the shields. These are an improvement on the hyperspace panic button of the original, because there is no random luck element involved. However, timing is all important. New players tend to press the shields too early and waste this far from

# ARCADE



## ASTEROIDS DE LUXE

inexhaustible means of defence.

The U.F.O.s are a very different proposition in *de Luxe*. The small one is usually on patrol early and is far more deadly, hitting stationary targets with ease and also picking you off if you move in a straight line. So weave!

No point in leaving that last rock and waiting in a corner to build up a high score in this version either. The small U.F.O. responds by blowing up that last rock with its first shot and your

ship normally follows soon after.

When the "geometric" asteroids begin appearing it is best to leave them until you have room to manoeuvre. When these are hit, three homing missiles are loosed upon you and fire and run tactics are the best way to reduce the threat of these splitting horrors.

As in the earlier *Asteroid* version, the best players learn how to use the thrust and keep on the move.

## ROYAL SNATCH AND GRAB

It's back in time, for once, in the King and Balloon aerial defence game.

Instead of the usual space invaders and laser bases, this game features balloons which descend from the heavens and crossbows.

The balloons are the villains of the piece, attacking in squadrons of 42 which will stretch your more primitive resources to their limits.

You play the part of a faithful marksman employed to defend the royalty of the castle from the aerial kidnappers.

Should the invaders snatch your monarch, he proves quite vocal, crying for aid from his retainer and a well aimed shot

which downs the capturing balloon will enable him to parachute to safety murmuring his thanks.

When a squadron of balloons is downed by the crossbow a faster-moving one appears to attempt the next snatch and grab raid.

And should that royal figure disappear over the horizon, dangling captive from his basket, it's a case of: "The king is dead! Long live the king!", as another is sent out to tempt the balloons back.

Up to three kings can be lost before the game is over.

A fun variation on the usual theme which is not too demanding graphically but still challenging.

## STREET TALK

A brief rundown of machine slang: phrases and comments which players use while blowing up asteroids.

● **Reggae rattle** — a phrase to describe the constantly on the move player.

● **Orgy of destruction** — keeping up a constant stream of fire in an attempt to wear down the meteors.

● **A bouncer** — a player who makes good use of his shields.

● **Bad boulder** — a meteorite which will unleash missiles when blown up.

As far as we can tell there are no noticeable programming bugs in *Asteroids de Luxe*.

● Next issue we look at the popular but tactically difficult arcade game of *Defender*.

## GOLF: NOT JUST FOR THE CLUBS

Japan goes in for crazes with such gusto that our flirtation with Rubik's Cube seems half-hearted by comparison.

So *Pro Golf*, which combined the crazes of golf and video games (two of Japan's biggest) was bound to be a hit over in the Orient.

But our own arcade industry is pessimistic about this graphically superb game finding a following over here. The game is certainly a far cry from the usual space-fodder fare to be found in pubs and arcades but it could worm its way into western hearts.

A nine hole golf course is to be played. Choose your club, address the ball and hit, before the golfer takes his fifth automatic swing, or you will lose your ball.

A limited number of balls are allowed per hole and if that is passed a golfer will also be lost. Trees, ponds, bunkers and out-of-bounds areas add to the difficulty. Each hole has its own par score and holes in one are possible.

A game which deserves to see a wider audience than just the "19th holes" of the golf clubs.



# ACTCOM

## KING KONG GOES CRAZY IN A CABINET

The box-office success, King Kong, now looks likely to become a success in a box — or at least an arcade cabinet — in the game Donkey Kong.

Kong has captured an electronic starlet and is holding her hostage at the top of the screen. He hurls down barrels at the rather unheroic rescue figure as he rushes up a series of tilting levels. The rescuer must leap over the oncoming barrels and so make his way to Kong's hideout. A hammer with which to knock the barrels clear of the level, can be reached by a well-timed leap skywards.

Once at the top, Kong realising he is beaten, picks up our heroine and carts her off to a new screen, here the rescuer must leap between passing lifts to attain the giant chimp's hide-out.

On achieving this, the screen changes again to a conveyor belt affair and so the chase continues, with Kong hurling obstacles in the path of our plucky hero until the girl is finally saved... then it all starts again only with more obstacles.

Can Jumpman save the wretched heroine? Find out down your local arcade.



## AN AMPHIBIOUS ARCADIAN

The arcade games industry seems to have discovered a new hero figure to tempt us onto its machines.

It is questionable whether hard-bitten arcade and pub veterans, who are used to seeing themselves as laser bases or rocket ships, will be able to identify with this new character — a frog — but he seems to be cropping up in several games now.

Frogger is one of the popular new generation of arcade games which are getting away from space themes.

It does give an idea of how tough a life frogs may lead. Our intrepid amphibian is first set the problem of crossing a busy highway without getting run over.

Manoeuvring the creature by a joystick, either vertically or horizontally, it must avoid a steady stream of vehicles to reach the river bank. Here the aim is to cross without falling in, via a series of logs and the treacherous diving turtles, who are not averse to giving a hurrying frog an early bath.

Other terrors lurking here include deadly snakes, otters and crocodiles.

Points are scored for each safe jump (10), arriving safely home (50) and beating the timer (10 points per beat saved). Bonuses can be accrued by escorting home a lady frog (200), gobbling an insect (200) and safely getting all five frogs home (1,000).

## ALIENS ABOVE THE SKYLINE

Piloting your craft above a New York-like skyline gives you first taste of the Space Odyssey challenge — but the action does not stop there.

Space Odyssey is reminiscent of the Defender game but with a much less daunting array of buttons to become familiar with.

Just two buttons and a lever here. The buttons are simply "Fire" and "Bomb" and the lever gives you all the manoeuvrability you will need on the long voyage ahead of you.

Missiles are launched from the

ground to prompt you forwards and a fleet of alien spacecraft speeds towards you. Firing to pick off those you can, while flying skilfully to avoid the rest of the enemy craft and the tall buildings, you pick your way through the waves of attackers.

A regular feature of the early waves is the laser-firing Mother Ship Galactica, a large craft which appears initially to be indestructible but a little perseverance will prove otherwise. Later the action switches to a mountainous moonscape.

So the game progresses until you are speeding between large black holes which will draw you into their voids should you fly too close and leave you spinning and vulnerable to enemy fire. Then it is back to the opening sequence again.

The game is easy to learn, the action is always changing and the graphics and backdrops are among the best you will see. If you liked the idea of Defender but found it too difficult to master, Alca Electronics is distributing the game for you.

## GALAXIANS MARK II

The second generation of Galaxians is on its way to our arcade skies.

This new breed, which bears the Midway logo, do not sit passively in the skies waiting to be shot at but swarm in from the sides of the screen to form their convoy and then dive groundwards to put your laser station out of action.

Apart from this peculiar behaviour, the new creatures resemble and attack in the same fashion as the already popular Galaxians. And the action will be just as frantic as before.

One other important change is the name, this new breed answer to the name of Galgas.





# CHOMP

Arsenic and Old Lace's elderly poisoners probably played Chomp while waiting for their victims to tuck into their last supper.

The supper prepared on the Sharp screen in this game is going to be somebody's last too. The screen is set out like a large piece of cake but the piece in the top right hand corner could have been made by Lucrezia Borgia.

The fact that it is labelled "Poisoned" is a bit of a giveaway.

But the cake has to be finished so someone is going to end up eating the piece which will give them more than heartburn! The players take it in turns to Chomp on a piece of cake and try to manoeuvre their opponents so as to force them to eat from that poisoned section.

This game makes good use of the Sharp's musical facility and includes a fitting end to the game when that fatal Chomping has taken place.

Not for the queasy!



# P



```

5 DIM N$(10)
10 PRINT " "
20 PRINTAB(15):PRINT"C H O M P"
40 PRINTAB(14):PRINT" "
55 PRINT" The board is set out like a large piece"
65 PRINT" of cake, but the piece in the top right"
75 PRINT" hand corner is POISONED."
85 PRINT" KILL your opponent by forcing him"
95 PRINT" to take the poisoned section."
130 PRINT" Choose the board size - up to 9x9"
150 PRINT" The poisoned piece is shown as P"
160 PRINT" -edible pieces are displayed as E"
170 PRINT" PRESS ANY KEY TO CARRY ON"
191 FOR A=1 TO 40:FOR B=255 TO 1 STEP -1:POKE4514,B:
192 USR(71)
195 GETAS:TFAS==" THEN195
200 PRINT " "
200 DIM A(10,10)
210 PRINT " "
300 F=1
310 F=0
320 FOR I=1 TO 10
330 FOR J=1 TO 10
340 A(I,J)=0
350 NEXT J
360 NEXT I
380 PRINT " "
390 INPUT"HOW MANY PLAYERS ";P
391 FOR F=1 TO P
393 INPUT"INPUT NAMES OF PLAYERS ";N$(F)
394 NEXT
400 I1=0
410 PRINT " "
420 INPUT"HOW MANY ROWS ";R
430 IF R<9 THEN 480

```

```

440 PRINT " "
450 PRINT"The maximum amount of columns is 9"
460 GOTO 420
470 PRINT " "
480 PRINT " "
490 INPUT"HOW MANY COLUMNS ";C:PRINT "
500 IF C<9 THEN 540
510 PRINT " "
520 PRINT"The maximum amount of columns is 9"
530 GOTO 490
540 PRINT " "
550 FOR I=1 TO R
560 FOR J=1 TO C
570 A(I,J)=1
580 NEXT J
590 NEXT I
600 A(1,1)=-1
610 PRINT " "
620 PRINT"1 2 3 4 5 6 7 8 9"
630 FOR I=1 TO R
640 PRINT I:
650 FOR J=1 TO C
660 IF A(I,J)=-1 THEN 700
670 IF A(I,J)=0 THEN 720
680 PRINT" ";:PRINT " ";
690 GOTO 710
700 PRINT"P ";:PRINT " ";
710 NEXT J
720 PRINT
721 FOR E=0 TO 50
722 POKE4513,E:POKE 4514,E
723 USR(68)
724 NEXT E
725 PRINT
726 USR(71)
730 NEXT I
740 PRINT
750 IF F=0 THEN 770
770 LET I1=I1+1
780 LET P1=I1-INT(I1/P)*P
790 IF P1<0 THEN 810

```



# A GAME FOR APPRENTICE POISONERS

continued on page 35

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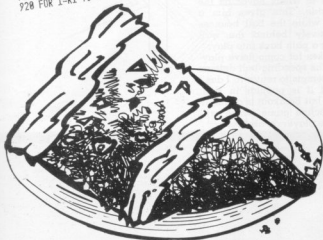
personal callers welcome

# SHARP

# CHOOSE YOUR SLICE WITH CARE

Continued from page 33

```
800 P1=P
810 PRINT"Player ":P1
820 INPUT"Coordinates of CHOMP (Row,Column) ":R1,C1
830 IF R1<1 THEN 900
840 IF R1>R THEN 900
850 IF C1<1 THEN 900
860 IF C1>C THEN 900
870 IF A(R1,C1)=0 THEN 900
880 IF A(R1,C1)=-1 THEN 900
885 PRINT" "
890 GOTO 920
900 PRINT"
901 PRINT"You can't CHOMP an empty space!!
910 FOR D=1 TO 5000:NEXT D:GOTO 810
920 FOR I=R1 TO R
```



```
930 FOR J=C1 TO C
940 A(J,J)=0
950 NEXT J
960 NEXT I
970 GOTO 610
980 PRINT"
990 PRINT"Bad luck you have lost player ":P1
1000 PRINT"
1010 PRINT"Do you want to play again (YES OR NO) "
1020 INPUT A$
1030 IF A$="YES" THEN 290
1035 PRINT" "
1036 PRINT"
1037 PRINT"CLOSEDOWN!!"
1040 L1$="C4C1R1C5D5_B6C3D5"
1040 L2$="E4E1R1E5F5E6D3C5"
1040 L3$="D5C5_D5C7C3R2"
1040 L4$="C3D3E3F3G4I1R16461R1"
1040 L5$="G4F3E3F4I1R1F4I1R1"
1040 L6$="F6E3D5E5F3E3D3C3"
1040 L7$="E6F3G5A3F3E7D7C8"
2010 TEMPOS
2020 MUSIC L1$:L2$:L3$:L4$:L5$:L6$:L7$
2025 PRINT" "
2030 FOR A=1 TO 300:R=INT(80*RND(1))
2040 S=INT(70*RND(1))
2050 SET R,S:NEXT A
2060 PRINT" "
2070 PRINT"
2080 PRINT"G O O D N I G H T ! ! "
2090 FOR D=1 TO 300:NEXT D
2100 PRINT" "
2110 FOR GS=1 TO 10000:NEXT GS
2120 END
```

## BREAKOUT

As a study in concentration and instinctive reactions, it's hard to beat Breakout.

This is the second generation of "bat and ball" arcade games and the only one to still keep its place in the pub circuit.

The aim of the game is to demolish a brick wall by bounding a moving ball against it by use of a bat.

As the ball hits each brick it vanishes from the screen and the ball rebounds to be hit again. But should it slip past your bat then you lose a life.

The experienced Breakout player aims his ball continuously at a single spot in the wall to weaken it and let the ball through to wreak havoc on the other side. This gives him a respite while the ball bounces destructively behind the wall seeking a path back into play.

It makes for compulsive playing as the speeding ball defeats your attempts to return it. I don't know if it is popular in H.M. Prisons but Breakout is a simple but effective game which will keep the player on his toes.

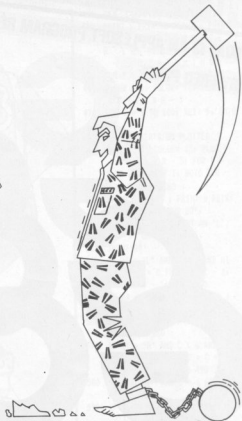
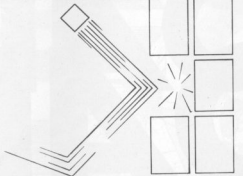


```

1 REM BREAKOUT
2 REM BY TIM JACKSON, JAN 81
10 DIM A1,PPS,BBS,LLS,NM6
20 FOR J=8 TO 5: LLJ=-1: BBJ=-1: PPJ=-1: NEXT
30 PRINT "12,821"
40 GOSUB #1: GOSUB #
50 PRINT#6
60 B=3: C=8
70 GPRINT" BREAKOUT"
80 PRINT"
90 PRINT"***BEST SCORE SO FAR = ",C
100 PRINT"***HOW FAST DO YOU WANT TO PLAY?"
110 INPUT"TYPE 1 TO 5 AND PRESS RETURN",#A
120 IF LEN A > 1 GOTO c
130 B=53-#A
140 IF B<0 OR B>4 GOTO c
150 CLEAR 0
160 MOVE 1,0: DRAW 1,44
170 MOVE 62,0: DRAW 62,44
180 "481=0"
190 PRINT "01E,00A,09,0223,0223
200 GOSUB #
210 PRINT #0,00A,09: GOSUB #> PRINT #255,0255,00,00A,09
220 PRINT #223,0223: GOSUB #1: PRINT "01E
230 B=0: "000=14
240 FOR N=5 TO 1 STEP -1: REM MAIN LOOP
250 X=ABS(RND*0.21: Y=35: REM INITIAL X & Y OF BALL
260 F=1: REM DOWN
270 R=ABS(RND*3-1): REM R,L OR 0
280 PRINT" SCORE: ",B," BALLS LEFT:",N,"01E
290 G=00000
300 PLOT 13,X,Y
310 Z=3
320 DO REM GRAPHICS LOOP
330 IF B=0 GOTO 4
340 FOR J=1 TO 8: WAIT: NEXT
350 GWAIT
360 LINK LL8
370 UNTIL Z<3
380 IF Z=0 PRINT #7: GOTO b
390 REM Z=0 IF BAT MISSED
400 IF Z=2 B=0:01: LINK NM6: GOTO b
410 REM Z=2 IF THRU" GAP
420 REM Z=1 IF BRICK HIT, AND
430 REM 0 THEN HOLDS SCREEN
440 REM ADDRESS OF BRICK HIT
450 IF DZ=1: Q=0-1
460 M=0-1
470 "0=09: "0=066
480 LINK NM3
490 "0=00: "0=00
500 S=5:01: GOTO F
510 NEXT N: REM NEXT BALL
520 PRINT" SCORE: ",B," BALLS LEFT: 0","01E
530 FOR J=1 TO 15: P=00A: NEXT
540 PRINT #9,"PRESS SPACE BAR TO PLAY AGAIN "
550 LINK #FF3
560 IF B<C C=B
570 PRINT #12: GOTO g
580 DIM P(-1)
590 ILL0
600 LDA #0001
610 AND #000
620 BEQ LL2
630 LDA #0002
640 AND #000
650 BNE LL3
660 ILL1 LDA #00
670 CMP #20
680 BCS LL3
690 INC #00
700 BNE LL3
710 ILL2 LDA #00
720 CMP #2
730 BCC LL3
740 DEC #00
750 ILL3 LOX #30
760 ILL4 LDA #01E,X
770 AND #0FC
780 STA #01E,X
790 DEX
800 BNE LL5
810 LOX #00
820 LOY #3
830 ILL5 LDA #01E,X
840 ORA #3
850 STA #01E,X
860 INX
870 DEY
880 BNE LL5
890 LDA #2
900 STA #5E
910 LDA #32A
920 BEQ #01 OUT IF Y=0
930 STA #5C
940 LDA #329
950 STA #5A
960 JSR #FAE2 BLANK BALL
970 LDA #329
980 CMP #2 CHECK L.H. WALL

```

# OUT



```

990 BNE B02
1000 LDA #11 STA #333
1010 BNE B03
1020B02 CMP #61 CHECK R.H.WALL
1030 BNE B04
1040 LDA #00FF: STA #333
1050B03 LDA #339
1060B04 CLC
1070 ADC #333
1080 STA #339 NEW X
1090 JSR PPS
1100 CLC
1110 LDA #33A
1120 ADC #33A
1130 CMP #45
1140 BEQ B05 OUT IF THRO' GAP
1150 STA #33A NEW Y
1160 LDA #339: STA #5A
1170 LDA #33A: STA #5C
1180 JSR #F6E2 PLOT BALL
1190 RTS
1200B05 LDA #21 STA #33B
1210 RTS OUT WITH Z=2
1220B06 STA #33B:RTS OUT WITHZ=0
1230PP0 LDA #339
1240 LSR A
1250 STA #5F STORE X/2
1260 LDA #47
1270 SEC
1280 SBC #33A
1290 SBC #33A Y = NEW Y
1300 LDX #00FF
1310 SEC
1320PP1 ZNX
1330 SEC #3
1340 PCS PP1
1350 ADC #3
1360 STA #A1 STORE (47-Y)X3
1370 TXA: ASL A: ASL A
1380 ASL A: ASL A: ASL A
1390 ORA #5F
1400 STA #5F STORE (X/2):(47-Y)/3X32
1410 LDA #001 ADC #0
1420 STA #A0 HI BYTE OF SCREEN ADDRESS
1430 LDA #339: LSR A
1440 LDA #A1
1450 ROL A: TAY
1460 LDA #F7CB,Y
1470 LDY #0
1480 AND (#5F),Y

```

```

1490 BEQ PPS RTN IF BIT CLEAR
1500 LDA #33A
1510 CMP #1: BNE PP3
1520 LDA #1
1530 STA #33A CO UP IF BAT HIT
1540 LDA #001: AND #00
1550 BNE PP4 BRANCH IF NO SHIFT
1560 LDA #333: BNE PPS
1570 DEC #333: DEC #339 DEC XAR
1580 RTS
1590PP4 LDA #002
1600 AND #440
1610 BNE PPS RTN IF NO REPT
1620 LDA #333: CMP #1
1630 BEQ PPS
1640 INC #333: INC#339 INC RAX
1650PP5 RTS
1660PP3 LDA #1
1670 STA #33B Z=1
1680 LDA #5F
1690 STA #332 SAVE BRICK POSN IN G
1700 RTS
1710NN0 LDA #002 HIGH BLEEP
1720 LDY #0FF
1730NN1 LOX #000
1740NN2 DEX
1750 BNE NN2
1760 EOR #4
1770 STA #0002
1780 DEY
1790 BNE NN1
1800 RTS
1810NN3 LDA #3 EXPLOSION
1820 STA #01
1830NN4 LOX #0FF
1840NN5 TXA: TAY
1850 LDA #0002
1860 EOR #4
1870 STA #0002
1880NN6 DEY: BNE NN6
1890 DEX: BNE NN5
1900 DEC #01: BNE NN4
1910 RTS
19203 RETURN
1930#FOR I=1 TO 7
1940 PRINT #255,#255,#223,#223:NEXT
1950 RETURN

```

# APPLE

## GOAL IS AN APPLESOFT PROGRAM REQUIRING AT LEAST 16K.

### BY FRED PENCE

# GOAL

At the far end of the board, the Goal is beckoning as you and the computer plan your respective routes to victory.

The computer is out to make things difficult for you but achieving life's goals should never be easy.

Moving a single counter alternately you must aim to outwit your opponent and be first to move into that elusive Goal area and win the game.

You can choose who takes the first move in this game of strategy and thinking ahead. If you wish the computer to go first, enter nought, or key-in a number between one and six if you are taking the first move.

Once the counter is set in motion, it can only be moved left, right or down but it cannot be returned to a box it has already entered.

Good use is made of the Apple graphics in a well thought out game with plenty of scope for tactical manoeuvring.

```
0 REM #####
```

```
1 REM ##
```

```
2 REM ## GOAL ##
```

```
3 REM ## BY ##
```

```
4 REM ## FRED PENCE ##
```

```
5 REM ##
```

```
6 REM ## NOV, 1979 ##
```

```
7 REM ##
```

```
8 REM #####
```

```
10 GOTO 1000
```

```
20 HOME : GR
```

```
30 DIM A(6,7)
```

```
40 FOR M1 = 0 TO 6: FOR M2 = 0 TO 7: A(M1,M2) = 0: NEXT M2: NEXT M1
```

```
50 R = 1: C = 1
```

```
60 HOME : GR : COLOR= 1: FOR X = 2 TO 38 STEP 6: VLIN 0,30 AT X: NEXT X: VLIN 31,39 AT 2: VLIN 31,39 AT 38
```

```
70 FOR Y = 0 TO 30 STEP 6: HLIN 2,38 AT Y: NEXT Y: HLIN 2,38 AT 39
```

```
80 REM PRINTING 'GOAL'
```

```
90 COLOR= 12
```

```
100 HLIN 5,10 AT 33: HLIN 5,10 AT
```

```
33: HLIN 8,10 AT 35: VLIN 33,37 AT 5: VLIN 35,37 AT 10: HLIN 14,19 AT 33: HLIN 14,19 AT 37: VLIN 33,37 AT 13: VLIN 33,37 AT 19
```

```
120 HLIN 22,27 AT 33: HLIN 22,27 AT 35: VLIN 33,37 AT 22: VLIN 33,37 AT 27
```

```
130 HLIN 30,35 AT 37: VLIN 33,37 AT 30
```

```
140 IF PG > 2 THEN PRINT "O. K. YOUR GO ": GOTO 160
```

```
150 GOTO 200
```

```
160 PRINT "- A NUMBER FROM 1 TO 6": INPUT N
```

```
170 IF N < 1 OR N > 6 THEN PRINT : PRINT "NO - YOUR GO ": GOTO 160
```

```
180 IF N = INT (N) THEN 280
```

```
190 PRINT : PRINT "AN INTEGER ": GOTO 160
```

```
200 PRINT "ENTER AN INTEGER FROM 1 TO 6 IF YOU WANT TO GO FIRST."
```

```
210 PRINT " IF YOU WANT ME TO GO FIRST ENTER 0": INPUT N
```





```

220 IF INT (N) = N THEN 260
230 PRINT : PRINT
240 PRINT " ENTER A N
 I N T E G E R "
250 PRINT : PRINT " (BETWE
 EN 0 AND 6) " : INPUT N
260 IF N > 6 OR N < 0 THEN PRINT
 : PRINT : PRINT : GOTO
 240
270 IF N = 0 THEN C = INT (6 *
 RND (2) + 1) : A(R,C) = - 1 :
 GOTO 440
280 C = N : A(R,C) = - 1 :
290 GOTO 490
300 REM COMPUTER'S GO
310 IF R = 5 THEN C6 = C6 + 1 : GOTO
 760
320 IF (C - INT (C / 2) * 2) =
 0 THEN 390
330 REM MOVE RIGHT
340 IF A(R,C + 1) = 0 THEN C = C

```

```

 + 1 : A(R,C) = - 1 : GOTO 440
350 IF R < 4 THEN J = INT (3 *
 (RND (2))) : IF J > 1 THEN R
 = R + 1 : A(R,C) = - 1 : GOTO
 440
360 IF A(R,C - 1) = 0 AND C > 1 THEN
 C = C - 1 : A(R,C) = - 1 : GOTO
 440
370 R = R + 1 : A(R,C) = - 1 : GOTO
 440
380 REM MOVE LEFT
390 IF A(R,C - 1) = 0 THEN C = C
 - 1 : A(R,C) = - 1 : GOTO 440
400 IF R < 4 THEN J = INT (3 *
 RND (2)) : IF J > 1 THEN R =
 R + 1 : A(R,C) = - 1 : GOTO 44
 0
410 IF A(R,C + 1) = 0 AND C < 6 THEN
 C = C + 1 : A(R,C) = - 1 : GOTO
 440
420 R = R + 1 : A(R,C) = - 1

```

```

430 REM COMPUTER'S GO PLOTTED
440 PRINT : PRINT : PRINT : PRINT
 " THE COMPUTE
 R I S" : PRINT : PRINT "
 T H I N K I N G" :
450 FOR T = 1 TO 1000 : NEXT T
460 GOSUB 870 : COLOR= 13 : PLOT 6
 * C - 1, 6 * R - 3
470 FOR T = 1 TO 100 : NEXT T : GOTO
 510
480 REM PLAYER'S GO PLOTTED
490 GOSUB 870 : COLOR= 13 : PLOT 6
 * C - 1, 6 * R - 3 : FOR T =
 1 TO 200 : NEXT T : GOTO 310
500 REM PLAYER'S GO
510 PRINT : PRINT : PRINT : PRINT
 " IT'S YOUR GO" :
520 PRINT : PRINT "INPUT AN 'L',
 AN 'R' OR A 'D' " :
530 INPUT B$
540 IF B$ = "L" AND C > 1 AND A(
 R,C - 1) = 0 THEN C = C - 1 :
 A(R,C) = - 1 : GOTO 490
550 IF B$ = "L" AND C = 1 THEN 6
 40
560 IF B$ = "L" AND A(R,C - 1) =
 - 1 THEN 660
570 IF B$ = "R" AND C < 6 AND A(
 R,C + 1) = 0 THEN C = C + 1 :
 A(R,C) = - 1 : GOTO 490
580 IF B$ = "R" AND C = 6 GOTO 6
 40
590 IF B$ = "R" AND A(R,C + 1) =
 - 1 THEN 660
600 IF B$ = "D" AND R < 5 THEN R
 = R + 1 : A(R,C) = - 1 : GOTO
 490
610 IF B$ = "D" AND R = 5 THEN P
 6 = PG + 1 : GOTO 690
620 IF B$ = "U" THEN PRINT : PRINT
 : PRINT " YOU CAN'T GO BAC
 K UP" : GOTO 520
630 PRINT : PRINT : PRINT : PRINT
 : PRINT " YOU MUST EITHER US
 E 'L' OR 'R' OR 'D'" : GOTO
 530
640 PRINT : PRINT : PRINT : PRINT
 " YOU CAN'T MAKE THAT MOVE.
 IT'S OFF" : PRINT "THE BOA
 RD."
650 GOTO 520
660 PRINT : PRINT : PRINT : PRINT
 " YOU CAN'T MOVE THERE; THAT
 'S WHERE " : PRINT "THE COUNT
 ER WAS JUST MOVED FROM."
670 GOTO 520
680 REM PLAYER WINS
690 COLOR= 0 : FOR Z = 1 TO 6 : PLOT
 6 * Z - 1, 27 : NEXT Z

```

continued on page 41

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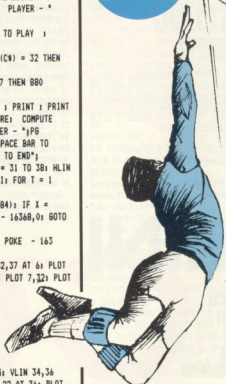
12" x 18" drawing board. Drawing on board is reproduced on TV via Atari with 32K RAM and Disk Drive. Closed areas may be filled in with one of 3 colours. Text may be added in any one of 4 fonts. Paint brush mode: select size of brush and paint away. Air brush mode: shade in your drawing - colour and density is up to you. Plus many more features. S.a.e. for price and further details.

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# GOAL



```

700 PRINT : PRINT : PRINT TAB(
71) "YOU WIN. YOU MUST BE LUC
KY!"
710 PRINT : PRINT "THE SCORE: C
OMPUTER - "jCBj" PLAYER - "
jPB
720 PRINT "SPACE BAR TO PLAY :
'ESC' TO END"j
730 GET Cj: IF ASC (Cj) = 32 THEN
40
740 IF ASC (Cj) = 27 THEN GOTO
750
750 GOTO 720
760 GOSUB 870: PRINT : PRINT
: PRINT "THE SCORE: COMPUTE
R - "jCBj" PLAYER - "jPB
770 PRINT : PRINT "SPACE BAR TO
PLAY : 'ESC' KEY TO END"j
780 COLOR= 0: FOR I = 31 TO 38: HLIN
3,37 AT I: NEXT I: FOR T = 1
TO 200: NEXT T
790 X = PEEK (- 16384): IF X =
160 THEN POKE - 16388,0: GOTO
40
800 IF X = 155 THEN POKE - 163
68,0: GOTO 880
810 COLOR= 6: VLIN 32,37 AT 6: PLOT
5,32: PLOT 5,37: PLOT 7,32: PLOT
7,37
820 VLIN 32,34 AT 15: VLIN 34,36
AT 16: HLIN 16,22 AT 36: PLOT
17,37: PLOT 20,37: PLOT 15,3
4: PLOT 15,35: VLIN 33,36 AT
22: VLIN 32,34 AT 23: PLOT 1
9,34: PLOT 19,35: PLOT 18,37
: PLOT 21,37
830 VLIN 32,37 AT 26: PLOT 25,32
: PLOT 25,37: PLOT 27,32: PLOT
27,37
840 VLIN 32,37 AT 29: VLIN 32,37
AT 33: PLOT 30,33: PLOT 30,
34: PLOT 31,34: PLOT 31,35: PLOT
32,35: PLOT 32,36
850 PRINT ""j
860 FOR T = 1 TO 100: NEXT T: GOTO
780
870 COLOR= 0: NORMAL : FOR F = 1
TO 6: FOR G = 1 TO 5: PLOT
6 * F - 1,6 * G - 3: NEXT G:
NEXT F: RETURN
880 TEXT : HOME : VTAB 14: PRINT
TAB(10): "WELL I ENJOYED IT
"j
890 PRINT : PRINT TAB(10): "HOP

```

```

E YOU DID TOO!"
900 PRINT : PRINT : PRINT : END
1000 HOME : GR : COLOR= 13
1010 HLIN 9,15 AT 8: VLIN 8,12 AT
12
1020 VLIN 8,12 AT 18: VLIN 8,12 AT
23: HLIN 18,22 AT 10
1030 VLIN 26,30 AT 8: HLIN 26,29
AT 10: HLIN 26,30 AT 12: VLIN
8,12 AT 26
1040 HLIN 5,10 AT 17: HLIN 5,10 AT
21: HLIN 8,10 AT 19: VLIN 17
,21 AT 5: VLIN 19,21 AT 10
1050 HLIN 5,10 AT 17: HLIN 5,10 AT
21: HLIN 8,10 AT 19: VLIN 17
,21 AT 5: VLIN 19,21 AT 10
1060 VLIN 17,21 AT 13: VLIN 17,2
1 AT 19: HLIN 13,19 AT 17: HLIN
13,19 AT 19
1070 VLIN 17,21 AT 22: VLIN 17,2
1 AT 27: HLIN 22,27 AT 18: PLOT
23,17: PLOT 26,17: PLOT 24,1
9: PLOT 25,19

```

```

1080 HLIN 30,34 AT 17: HLIN 30,3
3 AT 19: HLIN 30,34 AT 21: VLIN
17,21 AT 30
1090 HLIN 14,19 AT 25: HLIN 14,1
9 AT 29: VLIN 25,29 AT 13: VLIN
25,29 AT 19
1100 HLIN 22,27 AT 25: HLIN 22,2
5 AT 27: VLIN 25,29 AT 22
1110 HLIN 5,10 AT 33: HLIN 5,10 AT
37: HLIN 8,10 AT 35: VLIN 33
,37 AT 5: VLIN 35,37 AT 10
1120 HLIN 14,19 AT 33: HLIN 14,1
9 AT 37: VLIN 33,37 AT 13: VLIN
33,37 AT 19
1130 HLIN 22,27 AT 33: HLIN 22,2
7 AT 35: VLIN 33,37 AT 22: VLIN
33,37 AT 27
1140 HLIN 30,35 AT 37: VLIN 33,3
7 AT 30
1150 VTAB 24: PRINT TAB(20): "A
PENCE PROGRAM"j
1160 FOR K = 1 TO 5000: NEXT K
1170 TEXT : HOME : VTAB 3: PRINT
" YOU AND THE COMPUTER WILL
ALTERNATELY"
1180 PRINT : PRINT " MOVE A COU
NTER UNTIL THE WINNER MOVES"
1190 PRINT : PRINT " INTO THE G
OAL AREA."j: PRINT
1200 PRINT
1210 PRINT : PRINT " YOU MAY
CHOOSE WHO YOU WANT TO MOVE
FIRST"j
1220 PRINT
1230 PRINT " 0 FOR COMPUTER TO
MOVE FIRST"
1240 PRINT
1250 PRINT " A NUMBER FROM 1 T
O 6 TO PICK A BOX"
1260 PRINT " IN THE UPPER ROW
FOR YOUR GO"
1270 PRINT : PRINT "THEREAFTER Y
OU MOVE LEFT, RIGHT OR DOWN"
1280 PRINT "BUT YOU CANNOT RETUR
N TO A PREVIOUS BOX."
1290 PRINT : PRINT " (ADAPTED
FROM A GAME IN 'MATHEMATICS
IN MICHIGAN') 'SPACE BAR'
TO CONTINUE"j
1300 GET Sj: IF ASC (Sj) = 32 THEN
20
1310 GOTO 1300
1320 END

```

No municipal park, or seafont worthy of the rock bearing its name, should be without a putting green.

Those nine to 18 patches of well manicured turf which can divide friends and turn happy families into bitter rivals.

Remember that straggling white bush on the eighth, which belied its battered appearance and refused to surrender its white prize until the fifth stroke.

Or how about the fifth hole, whose cup protruded a solid half inch above the surrounding circle of dried and dented earth.

If someone were to write a thesis proving that that famous stiff upper lip was tempered on the putting greens of England... I wouldn't be at all surprised!

If you thought you had left those ninth green dandelion beheading tantrums behind you, this program will bring them back all over again. In fact the only putting frustration not to be experienced on this computerised version, is the wait for the previous group to move on.

Mini Golf is an excellent representation of a nine-hole miniature putting green, which will accommodate up to 10 players.

You control the angle of your putter by pressing the keys marked "+" and "-", which have small arrows marked on their

## ALL THE FRUSTRATION OF THE PUTTING GREEN

upper left-hand corners.

The following strings should be typed using the Atari logo key to produce reverse video:

Line 10: "ATARI 9 HOLE", and "MINIATURE GOLF"

Line 40: "SCORE:"

Line 2000: "FINAL SCORE:"

Line 4000: "GOOD BYE."

The messages such as: "HOLE 1" and "PAR 2" should be typed using reverse video for all nine holes.

## MINI GO

BY MITCH VOTH AND RICH BOUCHARD

```

1 REM # MINIATURE GOLF
2 REM # ORIGINAL PROGRAM BY
3 REM # BY MITCH VOTH
4 REM # ATARI TRANSLATION BY
5 REM # RICH BOUCHARD
6 REM
7 OPEN #1,4,0,"K:"
8 DIM Z$(100),A$(30),S(10)
9 GRAPHICS 0:PRINT "
9-HOLE":PRINT "
ATARI
MINIATURE
GOLF"
20 FOR A=1 TO 100:Z$(A)="":NEXT A
25 FOR A=1 TO 10:S(A)=0:NEXT A
30 PRINT "PRINT "PRINT "NUMBER OF PLAY
ERS":INPUT NP:IF NP>10 THEN 10
32 FOR A=1 TO NP:S(NP)=0:PRINT "PLAYER
#":INPUT A$:IF LEN(A$)>10 THEN A$=
A$(1,10)
33 IF LEN(A$)=0 THEN A$=" "
34 Z$(A$)=LEN(A$)+1:A$(10)=A$:NEXT A$
GRAPHICS 5:POKE 752,1
38 SETCOLOR 0,0,0:SETCOLOR 4,3,10:GOTO
300
40 GRAPHICS 0:POKE 752,1:PRINT "
SCORE":PRINT "FOR A=1 TO NP:PRINT Z
$(A$10-9,A$10),S(A$):NEXT A
42 PRINT "PRINT "HIT ANY KEY":GET #1,A

```



```

GRAPHICS 5:POKE 752,1:SETCOLOR 0,0,0:
SETCOLOR 4,3,10:RETURN
50 GET #1,Z:IF Z(50 AND Z)>48 THEN H$=(
Z-48)#1:H$=0:V$=0:COLOR A:PLOT C1,C2:
GOTO 200
60 T=0:IF Z(43 THEN 70
62 CP=CP+1:IF CP=17 THEN CP=1
64 COLOR A:PLOT C1,C2:GOTO 100
70 IF Z(42 THEN 50
72 CP=CP-1:IF CP=0 THEN CP=16
74 COLOR A:PLOT C1,C2:GOTO 100
90 COLOR 1:PLOT H$1,H$2:PLOT H$1+1,H$2
92 COLOR 3:PLOT B1,B2:LOCATE C1,C2,A:
F A(2 THEN COLOR 2:PLOT C1,C2:GOTO 50
94 COLOR 3:PLOT C1,C2:GOTO 50
100 GOTO CP+100
101 C1=B1:C2=B2+2:M1=0:M2=-1:GOTO 90
102 C1=B1+1:M1=-1:GOTO 90
103 C1=B1+2:C2=B2+2:M1=-2:GOTO 90
104 C2=B2+1:M2=0.5:GOTO 90
105 C2=B2:M2=0:GOTO 90
106 C2=B2-1:M2=0.5:GOTO 90
107 C1=B1+2:C2=B2-2:M1=-2:M2=1:GOTO 90
108 C1=B1+1:M1=-1:GOTO 90

```

```

109 C1=B1:M1=0:GOTO 90
110 C1=B1-1:M1=1:GOTO 90
111 C1=B1-2:C2=B2-2:M1=2:M2=1:GOTO 90
112 C2=B2-1:M2=0,5:GOTO 90
113 C2=B2:M2=0:GOTO 90
114 C2=B2+1:M2=-0,5:GOTO 90
115 C1=B1-2:C2=B2+2:M1=2:M2=-1:GOTO 90
116 C1=B1-1:M1=1:GOTO 90
150 COLOR 3:PLOT HP1,HP2:PLOT HP1+1,HP
2:IF S1 THEN 156
152 PRINT "A HOLE IN ONE!!!!!!":FOR A=
1 TO 5:FOR B=1 TO 59:SETCOLOR 4,B/4+1,
14:SOUND 0,B,0,10:NEXT B:NEXT A
154 SETCOLOR 4,3,10:SOUND 0,0,0,0:GOTO
158
156 PRINT "THAT TOOK YOU "S1" STROKES
":FOR A=1 TO 50:SOUND 0,A,10,10:NEXT A
:FOR A=49 TO 2 STEP -1
157 SOUND 0,A,10,10:NEXT A:SOUND 0,0,0,
0
158 FOR A=1 TO 700:NEXT A:PRINT CHR$(2
B)":"
:PRINT CHR$(28):CHR$(28):RETURN
200 D1=B1:D2=B2:COLOR 2:PLOT B1,B2:IF
(ABS(M1)=1 AND MM=1) OR ABS(M1)=2 THEN
204
202 MM=1:GOTO 210

```

```

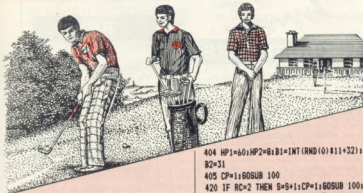
C=1:GOSUB 150:RETURN
214 LOCATE HP1+1,HP2,A:IF A<1 THEN S(
PT)=S(PT)+S-P:RC=1:GOSUB 150:RETURN
220 COLOR 2:PLOT B1,B2:IF (ABS(M2)=0,5
AND MM=1) OR ABS(M2)=1 THEN D2=B2+SGN
(M2):MM=0:GOTO 230
222 VM=1
224 LOCATE B1,D2,A:IF A=0 THEN RC=0:RE
TURN
231 IF (D1<HP1 AND D1<HP1+1) OR D2<
HP2 THEN IF A=1 THEN RC=0:RETURN
232 COLOR 3:PLOT B1,D2:B2=B2:LOCATE HP
1,HP2,A:IF A=3 THEN S(PT)=S(PT)+S-P:RC
=1:GOSUB 150:RETURN
234 LOCATE HP1+1,HP2,A:IF A=3 THEN S(P
T)=S(PT)+S-P:RC=1:GOSUB 150:RETURN
240 T=0:MM=MM-1:IF MM<0 THEN RC=2:RETU
RN
242 GOTO 200
300 COLOR 2:FOR A=3 TO 36:PLOT 27,A:DR
AWTO 45,A:NEXT A:PRINT " HOLE # 1 P
AR 2"
302 P=2:FOR PT=1 TO NP:S=1:PRINT Z:(PT
810-9,PT810):""S TURN":B1=INT(RND(0))+1
321:B2=51:CP=1
304 HP1=35:HP2=6
305 GOSUB 100
310 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 310
320 IF RC=1 THEN NEXT PT:GOTO 400
325 GOSUB 3000
330 IF D1=26 OR D1=46 THEN M1=-M1:GOSU
B 200:GOTO 310
332 M2=-M2:GOSUB 200:GOTO 310
400 GOSUB 40:COLOR 2:FOR A=13 TO 36:PL
OT 27,A:DRAWTO 45,A:NEXT A:FOR A=0 TO
11:PLOT 27,A,13-A:DRAWTO 70,13-A
402 NEXT A:PRINT " HOLE # 2 PAR 2"
:FOR PT=1 TO NP:S=1:PRINT Z:(PT810-9,PT
810):""S TURN"

```

```

TO 420
500 GOSUB 40:COLOR 2:FOR A=13 TO 36:PL
OT 17,A:DRAWTO 55,A:NEXT A:FOR A=0 TO
11:PLOT 17,A,13-A:DRAWTO 55-A,13-A
502 NEXT A:COLOR 1:PLOT 36,10:DRAWTO 3
6,36
510 PRINT " HOLE # 3 PAR 2":FOR PT=
1 TO NP:PRINT Z:(PT810-9,PT810):""S TU
RN":B1=INT(RND(0))+1+42
512 S=1:B2=32:CP=1:HP1=25:HP2=32:GOSUB
100
520 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 520
530 IF RC=1 THEN NEXT PT:GOTO 600
540 GOSUB 3000
550 IF D2=1 OR D2=37 THEN M2=-M2:GOSUB
200:GOTO 520
552 IF D1=16 OR D1=36 OR D1=56 THEN M1
=-M1:GOSUB 200:GOTO 520
554 IF D1<36 THEN A=M1:M1=-M2:D1=M2=-A/
2:GOSUB 200:GOTO 520
556 A=M1:M1=M2:D1=M2+A/2:GOSUB 200:GOTO
520
600 GOSUB 40:COLOR 2:FOR A=13 TO 24:PL
OT 21,A:DRAWTO 63,A:NEXT A:FOR A=25 TO
26:PLOT 21,A:DRAWTO 35,A:NEXT A
602 FOR A=1 TO 8:PLOT 36+A,24+A:DRAWTO
63-A,24+A:PLOT 21+A,13-A:DRAWTO 63-A,
13-A:NEXT A
604 COLOR 1:PLOT 36,25:DRAWTO 36,14:DR
AWTO 51,14:PLOT 51,14:DRAWTO 51,24
610 P=3:PRINT " HOLE # 4 PAR 3":FOR
PT=1 TO NP:PRINT Z:(PT810-9,PT810):""
S TURN":B1=INT(RND(0))+8+20
615 S=1:B2=32:CP=1:HP1=43:HP2=19:GOSUB
100
620 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 620
630 IF RC=1 THEN NEXT PT:GOTO 700
640 GOSUB 3000
650 IF D2=4 OR D2=12 OR D2=37 OR (D2=3
AND D1=44 AND D1<55) OR (D2=14 AND D
1>36) THEN 654
652 GOTO 656
654 M2=-M2:GOSUB 200:GOTO 620
656 IF D1=20 OR D1=49 OR D1=51 OR D1=6
4 OR D1=36 THEN M1=-M1:GOSUB 200:GOTO
620
658 IF (D1>56 AND D2<13) OR (D2>24 AND
D1<57) THEN A=M1:M1=M2:D1=M2+A/2:GOSUB
200:GOTO 620
659 A=M1:M1=-M2:D1=M2=-A/2
660 GOSUB 200:GOTO 620
700 GOSUB 40:COLOR 2:FOR A=25 TO 36:PL
OT 41,A:DRAWTO 55,A:NEXT A:FOR A=1 TO
9:PLOT 33-A,25-A:DRAWTO 55,25-A
702 PLOT 24+A,11-A:DRAWTO 55-A,11-A:NE
XT A:FOR A=1 TO 5:PLOT 24,16-A:DRAWTO
55,16-A:NEXT A
704 COLOR 1:FOR A=1 TO 2:PLOT 55,25-A:
DRAWTO 45,15-A:NEXT A
710 PRINT " HOLE # 5 PAR 2":P=2:FOR
PT=1 TO NP:S=1:PRINT Z:(PT810-9,PT810

```



```

204 D1=B1+SGN(M1):MM=0
205 T=T+1:IF T=4 THEN RC=2:RETURN
210 SOUND 0,200,10,10:SOUND 0,0,0,0:LO
CATE B1,B2,A:IF A=0 THEN RC=0:RETURN
211 IF (D1<HP1 AND D1<HP1+1) OR D2<
HP2 THEN IF A=1 THEN RC=0:RETURN
212 COLOR 3:PLOT B1,D2:B1=D1:LOCATE HP
1,HP2,A:IF A<1 THEN S(PT)=S(PT)+S-P:R

```

```

404 HP1=60:HP2=B1:B1=INT(RND(0))+1+321:
B2=31
405 CP=1:GOSUB 100
420 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 420
430 IF RC=1 THEN NEXT PT:GOTO 500
435 GOSUB 3000
440 IF D2=1 OR D2=37 OR (D2=14 AND D1>
45) THEN M2=-M2:GOSUB 200:GOTO 420
442 IF D1<27 OR D1=46 OR D1=71 THEN M1
=-M1:GOSUB 200:GOTO 420
444 A=M1:M1=-M2:D1=M2=-A/2:GOSUB 200:GO

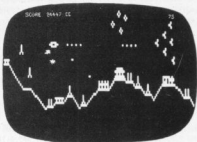
```

continued on page 45

## THE LATEST AND, INDEED, THE GREATEST

OF THE KANSAS ARCADE SERIES

## ARCADE SCRAMBLE



Don't waste your time playing the simple starts to the Big Five games — get straight into the heavy action with this brand-new multi-action, home grown 'Arcade' game.

Yes, it's the famous one of the Arcades, and the first time it's ever been achieved on a computer.

Not that easy though, for without warning suddenly there's a squadron of enemy fighters heading straight at you hell bent on your destruction. Then comes the ack-ack flung at you from the ground batteries to add to your difficulties, and there's the cluster of blimps to make things even more difficult.

But the real nasties are the rockets, which the enemy blast at you, without warning, from the ground installations.

Even if you manage to out-shoot, out-fight, out-maneuvre that little lot, you still have the mountains to negotiate which is a problem with the fighters streaming through the only available space.

But with this really unbelievable game, you have no less than six different controls at your fingertips, being able to move your bomber forward, backward, up and down, whilst at the same time both firing your guns at the enemy and bombing the installations.

The installations include rocket launch pads, ack-ack batteries, forts, munition dumps and fuel dumps. You do your damndest to destroy these as they unfold below, so building up your score.

There is so much happening it really is unbelievable with sound adding to the realism of this ultra-fast moving game.

**£9.50**

Programs are for the Tandy TRS 80 and Video Genie. All prices are VAT paid and postage free. Same day return first class post service. All software fully guaranteed and in stock as we are the actual publishers, not the retailers. Free catalogue upon request.

# Kansas

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Circle No. 115

## ZX80/81 HARDWARE/SOFTWARE

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4K RAM PACK  
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£15.95  
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ZX KEYBOARD  
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### RAM 80/81

#### 2K & 4K RAM

Static Ram memory expansion for the 80/81. They both work with onboard Ram i.e. 4K plus onboard = 5K. This is the cheapest small memory expansion available anywhere.

#### 16K RAM

Massive add-on memory for 80/81.

#### 16K KIT-A-KIT VERSION

of a 16K Ram. Full instructions included. All memory expansions plug into the user port at the rear of the computer.

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As seen at the ZX Microfair.

**DEFLEX** This totally new and very addictive game, which was highly acclaimed at the Microfair, uses fast moving graphics to provide a challenge requiring not only quick reaction, but also clever thinking. One and two player versions on same cassette. £3.95

**3D/3D LABYRINTH** You have all seen 3D Labyrinth games, but this goes one stage beyond: you must manoeuvre within a cubic maze and contend with corridors which may go left/right/up/down. Full size 3D graphical representation. £3.95

**CENTPEDE** This is the first implementation of the popular arcade game on any micro anywhere. Never mind your invaders etc this is positively shining, the speed at which this runs makes ZX invaders look like a game of simple snap. £4.95

Please add £1.00 p/p for all hardware.

Software p/p free.

Specify ZX80/81 on order.

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### KEY

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# cdK'tronics

23 Sussex Road, Gorleston, Great Yarmouth, Norfolk.

Telephone: Yarmouth (0493) 602453

Circle No. 116



continued from page 43

```

J1'S TURN:CP=1
715 B1=INT(RND(0)*8)+43:B2=33:HP1=33:H
P2=13:GOSUB 100
720 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 720
730 IF RC=1 THEN NEXT PT:GOTO 800
740 GOSUB 3000
750 IF D2=1 OR D2=37 OR (D2=25 AND D1<
41) THEN M2=-M2:GOSUB 200:GOTO 720
752 IF D1=23 OR D1=40 OR D1=56 THEN M1
=-M1:GOSUB 200:GOTO 720
754 IF D1<40 AND D2<11 THEN A=M1:M1=-M
24:M2=-A/2:GOSUB 200:GOTO 720
756 A=M1:M1=M24:M2=A/2:GOSUB 200:GOTO
720
800 GOSUB 40:COLOR 2:FOR A=25 TO 36:PL
OT 31,A:DRAWTO 43,A:NEXT A:FOR A=1 TO
11:PLOT 31,25-A:DRAWTO 51-A,25-A
801 NEXT A
802 FOR A=2 TO 13:PLOT 31,A:DRAWTO 62,
A:NEXT A:COLOR 1:FOR A=1 TO 21:PLOT 30+
A,24:DRAWTO 39-A,15:NEXT A
804 PLOT 41,15:DRAWTO 41,10:PLOT 49,10
:DRAWTO 49,4
810 PRINT " HOLE # 6 PAR 3:P=3:FOR
PT=1 TO NP:S=1:PRINT 26:(PT*10-9,PT*10
J1'S TURN"
815 B1=INT(RND(0)*8)+34:B2=33:HP1=33:H
P2=13:CP=1:GOSUB 100
820 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 820
830 IF RC=1 THEN NEXT PT:GOTO 900
840 GOSUB 3000
850 IF D2=5 OR D2=1 OR D2=37 OR (D2=25
AND D1<45) OR (D2=10) AND (D1=41 OR
D1=49) THEN M2=-M2:GOSUB 200:GOTO 820
852 IF D1=30 OR D1=46 OR D1=63 OR D1=4
9 OR (D1=41 AND D2<16) THEN M1=-M1:G0
SUB 200:GOTO 820
854 A=M1:M1=-M24:M2=-A/2:GOSUB 200:G0
TO 820
900 GOSUB 40:COLOR 2:FOR A=1 TO 9:PLOT
25-A,37-A:DRAWTO 54,37-A:PLOT 15-A,17
-A:DRAWTO 51-A,17-A:NEXT A
902 FOR A=21 TO 27:PLOT 16,A:DRAWTO 54,
A:NEXT A:FOR A=1 TO 4:PLOT 16,16-A:DR
AWTO 50-A,16-A:NEXT A
904 COLOR 1:PLOT 38,11:DRAWTO 50,23:PL
OT 38,16:DRAWTO 45,23:PLOT 26,27:DRAM
TO 38,27
906 PLOT 39,27:DRAWTO 39,36
910 PRINT " HOLE # 7 PAR 3:P=3:FOR
PT=1 TO NP:S=1:PRINT 26:(PT*10-9,PT*10
J1'S TURN"
915 B1=INT(RND(0)*8)+44:B2=33:HP1=33:H
P2=32:CP=1:GOSUB 100
920 IF RC=2 THEN S=S+1:CP=1:GOSUB 100:
GOTO 920
930 IF RC=1 THEN NEXT PT:GOTO 1000
940 GOSUB 3000

```

# MINI GOLF

```

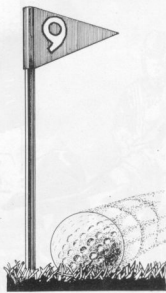
950 IF D1=15 OR D1=55 OR (D1=39 AND D2
>26) THEN M1=-M1:GOSUB 200:GOTO 920
952 IF D2=37 OR D2=7 OR D2=27 THEN M2=
-M2:GOSUB 200:GOTO 920
954 IF D1<25 AND D2<17 THEN A=M1:M1=-M
24:M2=-A/2:GOSUB 200:GOTO 920
956 A=M1:M1=M24:M2=A/2:GOSUB 200:GOTO
920
1000 GOSUB 40:COLOR 2:FOR A=27 TO 36:P
LOT 29,A:DRAWTO 43,A:NEXT A:FOR A=1 TO
8:PLOT 29-A,27-A:DRAWTO 43-A,27-A
1002 PLOT 21,19-A:DRAWTO 52,19-A:PLOT
21+A,11-A:DRAWTO 52-A,11-A:NEXT A
1004 COLOR 1:PLOT 30,11:DRAWTO 33,14:D
RAWTO 33,21:DRAWTO 36,24:PLOT 37,24:DR
AWTO 40,21:DRAWTO 40,14:DRAWTO 43,11
1010 PRINT " HOLE # 8 PAR 3:P=3:FOR
PT=1 TO NP:S=1:PRINT 26:(PT*10-9,PT*1
0)
1015 B1=INT(RND(0)*8)+32:B2=33:HP1=36:
HP2=17:CP=1:GOSUB 100
1020 IF RC=2 THEN S=S+1:CP=1:GOSUB 100
:GOTO 1020
1030 IF RC=1 THEN NEXT PT:GOTO 1100
1040 GOSUB 3000
1050 IF D2=37 OR D2=2 THEN M2=-M2:GOSUB
200:GOTO 1020
1051 IF D1=33 OR D1=40 THEN IF D2=21 O
R D2=14 THEN 1054
1052 IF D1=20 OR D1=53 OR D1=33 OR D1=
40 OR D1=28 OR D1=44 THEN M1=-M1:GOSUB
200:GOTO 1020
1054 IF (D1<43 AND D2>18) OR (D1<30 AN
D D2<11) OR (D1<36 AND D1<44) THEN A=M
1:M1=-M24:M2=-A/2:GOSUB 200:GOTO 1020
1056 A=M1:M1=M24:M2=A/2:GOSUB 200
1060 GOTO 1020
1100 GOSUB 40:COLOR 2:FOR A=27 TO 36:P
LOT 29,A:DRAWTO 43,A:NEXT A:FOR A=3 TO
27:PLOT 20,A:DRAWTO 52,A:NEXT A
1102 COLOR 1:PLOT 34,10:DRAWTO 31,13:P
LOT 39,10:DRAWTO 42,13:PLOT 27,14:DRAM
TO 35,22:PLOT 38,22:DRAWTO 46,14
1110 PRINT " HOLE # 9 PAR 4:P=4:FOR
PT=1 TO NP:S=1:PRINT 26:(PT*10-9,PT*1
0)J1'S TURN"
1115 B1=INT(RND(0)*8)+32:B2=33:HP1=36:
HP2=17:CP=1:GOSUB 100

```

```

1120 IF RC=2 THEN S=S+1:CP=1:GOSUB 100
:GOTO 1120
1130 IF RC=1 THEN NEXT PT:GOTO 2000
1140 GOSUB 3000
1150 IF D2=37 OR D2=2 OR D2=28 THEN M2
=-M2:GOSUB 200:GOTO 1120
1152 IF D1=19 OR D1=53 OR (D1=28 OR D
1=44) AND D2>26 THEN M1=-M1:GOSUB 200
:GOTO 1120
1154 IF (D1>37 AND D2>13) OR (D1<36 AN
D D2<14) THEN A=M1:M1=-M24:M2=-A/2:G0
SUB 200:GOTO 1120
1156 A=M1:M1=M24:M2=A/2:GOSUB 200
1160 GOTO 1120
2000 GRAPHICS 0:PRINT " FINAL SCORE
:PRINT :PRINT " PLAYER SCORE:PR
INT "
2005 FOR A=1 TO NP:PRINT 26:(A*10-9,A*1
0) " : "S(A):NEXT A
2010 PRINT :PRINT "PLAY AGAIN (Y/N) "
2020 GOSUB 3000:A=PEEK(764):IF A<43 A
ND A<35 THEN 2020
2030 IF A=43 THEN RUN
2040 PRINT :PRINT :PRINT "GOOD BYE." :C
LOSE 0:END
3000 SOUND 0,50,10,10
3005 HH=HH+10:IF HH<2 AND HH>=6 THEN H
=H+2
3010 SOUND 0,200,10,10
3020 SOUND 0,0,0,0:RETURN
9999 END

```



VIC-20

BY IVOR STONES

RUNS IN 3.5K

ON A VIC-20

# POT

Not just anybody can get served in the Computer & Video Games City Saloon.

Newcomers are challenged to prove that they are good enough to drink with the other games players. The only way to prove what a games player's gotta prove, is by demonstrating your nerve and reactions in a few rounds of Pot Shot.

The bar tender will fill your glass and slide it along the bar top to you. It will go over the edge and fall to the floor. You must fire at just the right moment to hit the

glass as it falls.

When you score six hits in one round, the game becomes harder and you have to hit just the handle for all subsequent rounds.

Don't worry about the bar bill, as many drinks as you want will be provided by your landlord, Vic!

Pot Shot is one of those deceptively simple but compulsive games. The graphics show just what can be obtained using the VIC-20's built-in character set.

Aspiring games writers

would do well to note how well Pot Shot puts 10 of the golden game rules into practice:

- 1) It is visually novel.
- 2) As a reaction game it is hard but not so hard that maximum scores cannot be obtained.
- 3) As the player improves the game automatically gets harder.
- 4) The rules are easy to understand and are printed in an interesting way.
- 5) The game does not require constant resetting by the player-so no interruptions.
- 6) If no keys are pressed the "attract mode" shows game operation.
- 7) Appropriate sound effects add to the overall impact.
- 8) Complicated character strings have been put in as data statements and odd symbols have been kept to a minimum to aid entry by readers.
- 9) Key program sections indicated by REMarks.
- 10) The game makes the most of the computer's facilities and memory.



# SHOT

```

0 REM VIC POT SHOT
1 REM (C) I A STONES.,MR.MICRO LTD
2 REM P.O.BOX24,SWINTON,MANCHESTER,M273AL
3 AA=73:BB=160:CC=103
5 RESTORE:SC=0
7 POKE36879,25:REM SCREEN COLOUR
9 SO=36876:V=36878:REM SOUND & VOL.
11 REM DATA FOR A#
13 A#="":FORI=1TO27:READA:A#=#+CHR$(A):NEXT
15 DATA18,158,46,17,157,157,146,172,18,32,17,157,203,17,157,146,28,223,18,223
17 DATA17,157,157,169,146,169,144
19 REM DATA FOR G#
21 G#="":FORI=1TO35:READA:G#=#+CHR$(A):NEXT
23 DATA144,175,18,17,157,162,162,162,164,164,145,157,146,172,17,17
25 DATA157,157,157,205,203,18,32,223,146,17,157,157,157,163,223,18,32,146
27 REM DATA FOR B#
29 B#="":FORI=1TO12:READA:B#=#+CHR$(A):NEXT
31 DATA31,167,17,157,167,164,165,157,145,157,167,201
33 REM DATA FOR C#
35 C#="":FORI=1TO25:READA:C#=#+CHR$(A):NEXT
37 DATA31,145,32,32,32,17,157,157,157,167,17,157,167,18,32,146,32,32,145,157,15
39 DATA157,167,201,32
41 A=7680:B=22:E=A+19*B+12:F=0
45 PRINT"J";
47 PRINT" CITY SALOON"
49 FORGAME=1TO6:R=0
51 D#=" "
53 Z#="XXXXXXXXXXXXXXXXXXXXXXXXXXXX"
55 PRINT"XXXXXXXX"TAB(19)A#
57 PRINTTAB(17)B#
59 IFSC=0THENPRINT"XXXX":FORI=1TO6:PRINT" ";:NEXT:PRINT:PRINT" ";
61 IFSC=0THENFORI=1TO6:PRINT" ";:NEXT:PRINT
63 IFSC=0THENPRINT"
65 PRINTLEFT$(Z$,11)"
67 PRINT"
69 PRINT"
71 PRINT"
73 PRINT"
75 PRINT"
77 PRINT"
79 PRINT"
81 PRINTLEFT$(Z$,19)TAB(13)G#:J=1
83 IFK<1THENGOSUB183
84 REM FILL GLASS
85 POKEV,8:FORI=128TO240:POKESO,I:POKESO-1,I
87 IF1/8=INT(1/8)THENPRINTLEFT$(Z$,10)TAB(18)MID$(D#,J,1):J=J+1
89 NEXT:POKESO,0:POKEV,0:POKESO-1,0
91 POKE198,0:REM CLEAR KEYBOARD BUFFER
93 PRINTTAB(19)" "
94 REM MOVE GLASS +
95 FORI=17TO8STEP-1:PRINT"XXXXXXXX"TAB(I)C#:GOSUB141:IFI=13THENGOSUB123
97 NEXT
98 REM MOVE GLASS DOWN
99 FORI=1TO13:PRINTLEFT$(Z$,I+9)C#"":GOSUB141:NEXT:PRINTLEFT$(Z$,22)"
101 PRINTZ#"";
103 POKEE-2+F,32

```

continued on page 49

# An education in computers starts with you!

There is another side to microcomputing, just as interesting as games, especially if you are a responsible parent or a teacher with responsibility for teaching computing or using computers as teaching aids. Computers In Education is an important and expanding field the implications and potential is only just beginning to be realised. If you have children, or are a teacher you have a responsibility to keep yourself informed of developments in this area. Educational Computing is written for you.

Every issue is packed with useful and up to date information covering product news, conference news, opinions, advice application stories, case studies and a forum for you to discuss your concerns and interests.

Each month we select a specific applications area. In the past we have looked at such subjects as Mathematics, Home Economics, Business Studies and Engineering. In the coming months we will be looking at Social Sciences, English, Computer Science and History.

We show the many interesting ways people are using computers as teaching aids. And give practical advice and guidance.

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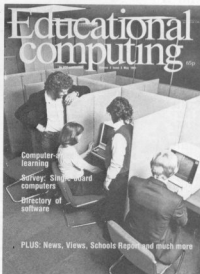
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**Educational Computing**  
the magazine looking to the future.

## POTSHOT

Continued from page 47

```

104 REM SMASH GLASS
105 F$=" "
107 POKEV,15:POKE36877,200
109 FORI=1T016:PRINTMID$(F$,I,1);:POKEV,16-I:FORJ=1T0200:NEXT:NEXT
111 POKE36877,0
113 PRINT2$;" "
115 PRINT" "
117 GOSUB131
119 F=0:H=1:NEXTGAME
121 GOTO173
122 REM SUB TO MOVE ARM
123 PRINT"XXXXXXXXXX"TAB(19)" "
125 PRINTTAB(18)" "
127 PRINTTAB(16)" "
129 PRINTTAB(19)" "
131 PRINT"XXXXXXXXXX"TAB(19)" "
133 PRINTTAB(18)" "
135 PRINTTAB(16)" "
137 PRINTTAB(19)" "
139 RETURN
141 IFF<0THEN147
143 REM TEST FOR SPACE BAR
145 GETK$:IFK$<>" "THENFORJ=1T020:NEXT:RETURN
147 F=F-1:IFF=-11THENF=0:RETURN
149 IFF<-2THENPOKE36877,0:POKEV,0:GOTO153
151 POKE36877,190:POKEV,15
152 REM CHECK IF HIT
153 P=PEEK(E-2+F):IFR=1THENRETURN
155 IFF=AAORP=BBORP=CCTHENGOSUB161:R=1:RETURN
157 POKEE-2+F,119:POKEE-2+F+30720,0:POKEE-1+F,32:POKE8098,32
159 RETURN
160 REM HIT
161 SC=SC+1:FORJ=1T02*SC:POKEA+3*B+J,32:NEXT
163 FORJ=1T02*SC:POKEA+4*B+J,32:NEXT
165 FORZ1=1T05
167 POKEV,15:FORZ=200T0230:POKES0,Z:NEXT:FORZ=230T0200STEP-1:POKES0,Z:NEXT:POKE
S0,0
169 NEXTZ1
171 RETURN
172 REM PRINT SCORE
173 PRINT"YOU GOT"SC"OUT OF 6 "
175 IFSC=6THENPRINT"SHARPSHOOTER":PRINT"DO I TAKE IT YOU DON'T WANT A DRINK?"
177 FORI=1T08000:NEXT:H=1:IFSC=6THENBB=AA
179 IFSC=6ANDBB=AA THENCC=AA
181 GOTO5
182 REM INSTRUCTIONS
183 READX$:IFX$="# "THENRETURN
185 FORI=1TOLEN(X$)
187 PRINT" "TAB(20)MID$(X$,I,1)
189 PRINT" "CHR$(20):FORDELAY=1T0100:NEXT
191 NEXTI:GOTO183
193 DATA"VIC POT SHOT"," THE BAR TENDER WILL POUR YOU A DRINK,"," AND "
195 DATASLIDE IT ALONG THE BAR TOP... YOU MUST SHOOT THE GLASSBEFORE IT HI
TS
197 DATA" THE FLOOR ...USING THE SPACE BAR TO FIRE.....FOLLOWING 6 HITS "
199 DATA"IN A ROW, THE GLASS WILL ONLY BREAK IF THE BULLET STRIKES THE HANDLE..
"
201 DATA"...YOUR FIRST DRINK IS COMIN' UP
203 DATA"#
READY.

```







A hand-drawn map of the Atlantic Ocean, focusing on the region between the equator and the Tropic of Capricorn. The map is oriented with North at the top. Key features include:

- Geographical Labels:** "BRAZIL" is written in large, bold letters across the South American continent. "DOLDRUMS" is written in a stylized font near the equator. "Horse LATITUDES" is written in a similar style further south. "ROARING FORTIES" is written at the bottom of the map.
- Wind Systems (indicated by red arrows):**
  - "TRADE WINDS" (Northward arrow from the top left).
  - "NE TRADES" (Southward arrow from the top center).
  - "SE TRADES" (Southward arrow from the right side).
- Ocean Currents (indicated by red arrows):**
  - "EQU. CURRENT" (Equatorial Current, flowing eastward along the equator).
  - "BRAZIL CURRENT" (flowing southward along the coast of Brazil).
- Other Features:**
  - A sailing ship is depicted in the Doldrums region.
  - A dolphin is shown near the Brazil Current.
  - A compass rose is located in the bottom right corner.
  - Partial labels "CENTIN" and "Cape Horn" are visible on the left side.
  - A red arrow at the bottom left points towards "CAPE HORN".
  - A red arrow at the bottom center points towards "DEAKES PASSAGE".

| NAME | NORTH-SOUTH | WEST-EAST |
|------|-------------|-----------|
|------|-------------|-----------|

|                  |             |           |
|------------------|-------------|-----------|
| Japan current    | 46N-32E     | 132W      |
| Japan current    | 32N-19.2E   | 129W-154W |
| Gulf Stream      | 46N-32E     | 39W       |
| Gulf Stream      | 32N-19.2E   | 63W       |
| Canaries current | 46N-32E     | 39W       |
| N. equs. current | 15.2E-8N    | —         |
| S. equs. current | 8S          | 24W       |
| S. eq. current   | 0-2.5       | —         |
| Humbolt current  | 9.2S-37.8S  | 162W      |
| Brazil current   | 9.2S-37.8S  | 46W       |
| Benguela current | 9.2S-37.8S  | 9W        |
| West wind drift  | 44.2S-64.6S | —         |

| NAME             | DIRECTION | SPEED (KNOTS) |
|------------------|-----------|---------------|
| Japan current    | South     | 1             |
| Japan current    | South     | .7            |
| Gulf Stream      | ENE       | 1.5           |
| Gulf Stream      | North     | 1             |
| Canaries current | ENE       | 1             |
| N. Eq. current   | West      | 1.2           |
| Guinea current   | East      | 1.3           |
| S. Eq. current   | West      | 2.1           |
| Humbolt current  | North     | 1.8           |
| Brazil current   | South     | 1.5           |
| Benguela current | North     | 2             |
| West wind drift  | West      | 2.2           |

| NAME | SOUTHERN LIMIT | TYPICAL WINGS |
|------|----------------|---------------|
|------|----------------|---------------|

|                  |      |                         |
|------------------|------|-------------------------|
| Horse Latitudes  | 32°N | Strong and variable     |
| Northeast Trades | 8°N  | Moderate from Northeast |
| Doldrums         | 3°S  | Calm and variables      |
| Southeast Trades | 28°S | Moderate from Southeast |
| Roaring Forties  | 64°S | Strong and Westerly     |

You will begin each turn by indicating the course you wish to sail. While the computer asks for a number, it will also respond to "N", "E", "S", and "W" for North, East South, and West.

Ships cannot sail directly into the wind, and yours is no exception. In fact, it will not sail closer than 45° to the direction from which the wind is coming. The computer will automatically change your course if the wind shifts against you, and

In the centre of the screen, directly above the waves, the computer will display any land that is in sight. Don't count on seeing land before you run aground! Sometimes you will see it in time and sometimes not. It is safer (but sometimes slower) to stay away from the coast completely.

There are some navigational aids provided by the computer. You have a compass in the centre of the ship, and a nameplate under it. When the computer accepts a course change, it will display "PORT" or "STARBD" where the nameplate is.

At the bottom left is information on the direction the wind is coming from and the windspeed. The bottom right displays the ship's calendar and your last navigation position. Expert players will want to depend on this latitude and longitude display extensively, for the map and land displays give only a rough indication. As a help to players, I have enclosed a table of ocean currents, a table of climatic regions, and some notices to mariners, all of which relate to the latitude and longitude.

Landlubbers may assume that a ship will sail in the direction she is pointed, but "it ain't necessarily so".

Two other factors affect your course: leeway and current. Leeway is the result of the wind blowing you off course in the direction it is blowing. Current carries you in the direction the water is flowing.

Weather is also a factor, but there is a trick to it: the computer only checks the region at the beginning of each turn. So, you can wait just north or south of the Doldrums for a good wind, and possibly get completely across without getting stuck. If you think this is cheating enter this line in your program:

1110 GOSUB 7000:GOSUB 7600

The region will then be checked on each half-day, but the game may take longer.

```

10 REM # AROUND THE HORN #
20 REM # COPYRIGHT 1978 GEORGE BLANK LEECHBURG PA 15656 #
30 $OSUB 3000
99 'INITIALIZE
100 CLEAR 600
110 DIM D(3):DIM E(3,4):DIM H(15):DIM L(16,3):DIM W(3,12):DIM S(
3,2):DIM T(3,2):DIM V(15):DIM W(5,4)
120 DIM D$(15)
130 FOR A=0TO15:READ D$(A):READ H(A):READ V(A):NEXT
140 FOR A=1TO3:READ C$(A):NEXT
160 W$(0)=".....0000.....0000.....0000.....0000....."

```

```

170 W(1)=LEFT$(W$(0),16):W(2)=MID$(W$(0),3,16):W(3)=MID$(W$(0),
1,6,16):W(4)=MID$(W$(0),9,16):W(5)=RIGHT$(W$(0),16)
190 FOR A=1 TO 3: N(A,1)=35:N(A,2)=1.1:N(A,3)=99:N(A,4)=1:N(A,5)=1:
NEXT
200 FOR A=1 TO 5: W(A,1)=29+RND(100)/100:NEXT
210 W(1,1)=W(1,1)+1:W(3,1)=W(3,1)-1
220 FOR A=1 TO 5: N(A,8)=W(1,1):NEXT
300 CLS:PRINT
310 PRINT"CLIPPER - A RACE AROUND THE HORN TO CALIFORNIA IN 1852
"
320 PRINT:PRINT"HOW MANY PLAYERS (1 TO 3) ?"
330 AS=INKEY$:IF AS="" THEN 330 ELSE P=VAL(AS)
340 IF P<1 THEN P=1
350 IF P>3 THEN P=3
360 IF P<3 THEN N(3,0)=10
370 IF P=1 THEN N(2,0)=10
380 PRINT P;"PLAYER";:IF P=1 THEN PRINT"S";
390 PRINT
999 'CONTROL ROUTINE
1000 IF N(1,0)=-10 AND N(2,0)=-10 AND N(3,0)=-10 THEN 2300
1010 GOSUB 7500
1020 FOR C=1 TO P
1025 IF N(C,0)=-10 THEN 1170
1030 GOSUB 7000:GOSUB 7600:GOSUB 7700
1040 GOSUB 9000
1050 GOSUB 8000
1060 FOR CL=1 TO 14
1062 IF WR=0 THEN 1150
1065 GOSUB 8200
1070 GOSUB 8040
1075 GOSUB 8200
1080 GOSUB 2060
1085 IF INT(CL/2)=CL/2 THEN D(C)=D(C)+1
1090 GOSUB 8300
1100 GOSUB 8200
1120 GOSUB 7700
1130 GOSUB 8200
1140 GOSUB 8400
1150 NEXT CL
1160 WR=0
1170 NEXT C
1190 GOTO 1000
1999 'NEW LOCATION
2000 R=N(C,4):T=0:N(C,0)=N(C,12)
2009 'PORT TACK
2010 IF N(C,0)<N(C,11) THEN T=N(C,0)-N(C,11):T(C,2)=2:IF T=1 THEN
N T=2:N(C,0)=N(C,0)+1
2019 'STARBOARD TACK
2020 IF N(C,0)<N(C,11) THEN T=N(C,11)-N(C,0):T(C,2)=1:IF T=1 THEN
N T=2:N(C,0)=N(C,0)-1
2025 IF N(C,0)>15 THEN N(C,0)=0
2030 IF T=0 THEN N(C,0)=N(C,0)-1:GOTO 2020
2035 IF N(C,0)<0 THEN THEN N(C,0)=16+N(C,0)
2040 IF T=0 THEN T=16-T
2050 IF T=1 THEN M=.6:T(C,1)=1:IF T=3 THEN M=.1:T(C,1)=2:IF T=5 T
HEN M=.2:T(C,1)=3
2052 IF T(C,1)<S(C,1) OR T(C,2)<S(C,2) THEN GOSUB 2500
2055 M=N(C,5):N(C,10)=8:GOTO 8050
2060 D=N(C,0):H=N(C,1):V=N(C,2):L=M(R,4):B:IF L>15 THEN L=L-16
2070 H=(H+(D)*M)/6+H/1600:N(C,10)=N(C,6)/30
2080 V=V+(V(D)*M)/10+V/1000:N(C,10)+N(C,7)/50
2085 GOSUB 2400
2090 N(C,1)=H:N(C,3)=V:N(C,3)=INT(V)*84+INT(H)
2100 IF N(C,3)=145 THEN 2600
2190 RETURN
2200 CLS
2210 PRINT
2220 PRINT"SOS SOS SOS"
2230 PRINT
2240 PRINT"SHIP WRECK!"
2250 PRINT
2260 PRINT"THE CLIPPER "J(C,C)" WAS LOST AT SEA WITH ALL HANDS"
2265 GOSUB 2700
2270 N(C,0)=-10:E(C,1)=2:E(C,2)=H:E(C,3)=V:E(C,4)=D(C):N(C,3)=99
2275 PRINT"LAST REPORTED POSITION "J(C,C):PRINT USING F#;L#;PRINT US
ING G#;LO
2280 FOR A=1 TO 2000:NEXT A
2290 WR=1:RETURN
2299 'END OF GAME
2300 CLS:PRINT:PRINT"GAME OVER":PRINT
2310 FOR C=1 TO P
2320 IF E(C,1)=2 THEN 2350
2330 PRINT"THE CLIPPER "J(C,C)" SAILED TO SAN FRANCISCO IN";E(
C,4);"DAYS"
2340 PRINT:GOTO 2370
2350 PRINT"THE "J(C,C)" WAS LOST AT SEA AFTER";E(C,4);" DAYS"
2360 H=E(C,2):V=E(C,3):GOSUB 2700:PRINT"NEAR "J(C,C):PRINT USING F#;
L#;PRINT USING G#;LO
2365 PRINT
2370 NEXT C
2380 INPUT(PRESS ENTER FOR NEW GAME):A$
2390 RUN
2400 B$="### DAYS "J(C,C)"
2410 PRINT USING B#;D(C)
2420 GOSUB 2700
2430 PRINT# 1005,""
2440 PRINT USING F#;L#;
2450 PRINT USING G#;LO
2490 RETURN
2500 IF S(C,2)=T(C,2) THEN 2540
2510 IF S(C,2)=2 THEN 1=6+S(C,1)+1:FOR B=15392015904 STEP 64:FO
R A=B+1 TO B+1:POKE A,128:NEXT A:1=X+1:NEXT B
2520 IF S(C,2)=1 THEN 1=6+S(C,1)+1:FOR B=15392015904 STEP 64:FO
R A=B+1 TO B+1:POKE A,128:NEXT A:1=X+1:NEXT B
2530 GOTO 8050
2540 IF T(C,1)=S(C,1) THEN 2530
2550 IF T(C,2)=2 THEN 1=6+S(C,1)+9:Y=6+T(C,1):FOR B=15392015904
STEP 64:FOR A=B+1 TO B+1:POKE A,128:NEXT A:Y=Y+1:NEXT B
2560 IF T(C,2)=1 THEN 1=6+S(C,1)+9:Y=6+T(C,1):FOR B=15392015904
STEP 64:FOR A=B+1 TO B+1:POKE A,128:NEXT A:Y=Y+1:NEXT B
2570 GOTO 8050
2600 CLS:PRINT
2610 PRINT"THE CLIPPER "J(C,C)" HAS JUST ARRIVED IN SAN FRANCIS
CO"
2620 PRINT"AND IS UNLOADING CHOICE EASTERN MERCHANDISE AT THE WH
ARF.":PRINT
2630 PRINT" THIS FAST SHIP,"J(C,C)" DAYS OUT OF NEW YORK, IS NO
W"
2635 PRINT"BOOKING PASSENGERS AND FREIGHT FOR NEW YORK."
2640 E(C,1)=1:E(C,4)=D(C):N(C,0)=-10
2650 PRINT:PRINT"TOUCH ANY KEY TO CONTINUE"
2660 AS=INKEY$:IF AS="" THEN 2660
2690 GOTO 1000
2700 IF V=0 THEN 2740
2710 F$=" ##.## N"
2720 L#=(L-V)*8.2
2730 GOTO 2760
2740 F$=" ##.## S"
2750 L#=(V+L)*8.2
2760 B$=" ##.## M"
2770 LO=L*14-H*3
2790 RETURN
2999 'INSTRUCTIONS
3000 CLS:PRINT
3010 PRINT" THIS GAME SIMULATES A CLIPPER SHIP RACE AROUND THE
HORN"
3020 PRINT"DURING THE CALIFORNIA GOLD RUSH, THE FIRST PERSON TO
GO"
3030 PRINT"FROM NEW YORK (N) TO SAN FRANCISCO (S) WINS."
3040 PRINT:PRINT" TO SAIL YOUR SHIP, AT THE BEGINNING OF A TU
RN, ENTER"
3050 PRINT"YOUR INTENDED COURSE AS DIRECTED. IF YOU WANT TO CHAN
GE"

```

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| 2776 4500s      | 1+240  |                    |       |             | 0.80  | 74LS123     | 0.30  |
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| 25+072          |        | 8216               | 1.70  | 4516        | 0.75  | 74LS151     | 0.94  |
| 6116 2000s      | 10.90  | 8218               | 2.45  | 4518        | 0.40  | 74LS153     | 0.30  |
| 4116 2000s      | 3.90   | 8228               | 3.90  | 4519        | 0.28  | 74LS155     | 0.30  |
| 6594 2000s      | 12.00  | 8251               | 3.90  | 4520        | 0.80  | 74LS156     | 0.34  |
| 6596 2000s      | 22.80  | 8253               | 7.90  | 4521        | 1.40  | 74LS157     | 0.34  |
|                 |        | 8255               | 3.95  | 4522        | 1.20  | 74LS158     | 0.36  |
|                 |        |                    |       | 4526        | 0.70  | 74LS160     | 0.30  |
|                 |        |                    |       | 4527        | 0.80  | 74LS181     | 0.30  |

## CRT CONTROLLERS

### AND GRAPHIC DISPLAY PROCESSORS

|        |       |      |      |      |      |         |      |
|--------|-------|------|------|------|------|---------|------|
| EP3004 | 5.94  | 4001 | 0.12 | 4528 | 0.70 | 74LS162 | 0.30 |
| EP3005 | 62.00 | 4002 | 0.13 | 4532 | 0.30 | 74LS163 | 0.30 |
| EP3006 | 62.00 | 4003 | 0.13 | 4541 | 1.30 | 74LS164 | 0.47 |
|        |       | 4004 | 0.80 | 4543 | 0.90 | 74LS165 | 0.80 |
|        |       | 4007 | 0.17 | 4553 | 2.80 | 74LS166 | 0.84 |
|        |       | 4008 | 0.35 | 4555 | 0.60 | 74LS173 | 0.70 |
|        |       | 4008 | 0.29 | 4556 | 0.54 | 74LS174 | 0.54 |
|        |       | 4010 | 0.28 | 4585 | 0.96 | 74LS175 | 0.54 |
|        |       | 4011 | 0.14 |      |      | 74LS181 | 0.30 |
|        |       | 4012 | 0.16 |      |      | 74LS190 | 0.55 |

## BUFFERS

|        |      |      |      |  |  |  |  |
|--------|------|------|------|--|--|--|--|
| 81LS00 | 0.90 |      |      |  |  |  |  |
| 81LS06 | 0.90 |      |      |  |  |  |  |
| 81LS07 | 0.90 |      |      |  |  |  |  |
| 81LS08 | 0.90 |      |      |  |  |  |  |
| 82TSA  | 1.50 | 4013 | 0.33 |  |  |  |  |
| 82TSA  | 1.50 | 4014 | 0.33 |  |  |  |  |
| 82TSA  | 1.50 | 4015 | 0.33 |  |  |  |  |
| 82TSA  | 1.50 | 4016 | 0.33 |  |  |  |  |
| 82TSA  | 1.50 | 4017 | 0.33 |  |  |  |  |
| 82TSA  | 1.50 | 4018 | 0.33 |  |  |  |  |

## DATA CONVERTERS

|        |       |  |  |  |  |  |  |
|--------|-------|--|--|--|--|--|--|
| 2M4245 | 3.50  |  |  |  |  |  |  |
| 2M4246 | 3.50  |  |  |  |  |  |  |
| 2M4247 | 6.20  |  |  |  |  |  |  |
| 2M4248 | 4.70  |  |  |  |  |  |  |
| 2M4249 | 2.10  |  |  |  |  |  |  |
| 2M4250 | 28.00 |  |  |  |  |  |  |
| 2M4251 | 22.80 |  |  |  |  |  |  |
| 2M4252 | 56.63 |  |  |  |  |  |  |

## MISCELLANEOUS

|       |  |
|-------|--|
| 8799  |  |
| 8797A |  |
| 8798  |  |

```

3100 PRINT "COURSE DURING A TURN, PRESS / (OR S) FOR A TURN TO *
3110 PRINT "STANDARD (RIGHT) OR PRESS Z (OR P) TO TURN TO PORT
(LEFT)." : PRINT
3230 PRINT "ANTARCTIC ICE BEGINS AT 64.4 DEGREES SOUTH. CAPE HO
RN"
3240 PRINT "EXTENDS FROM 69 DEGREES WEST TO 74 DEGREES WEST AT 55
.5"
3250 PRINT "DEGREES SOUTH. IF YOU TOUCH ANY OF THESE BOUNDARIES O
R ANY"
3260 PRINT "OTHER LAND MASS, YOU WILL SHIPWRECK." : PRINT : INPUT " (
PRESS ENTER) " : A$
3270 CLS : PRINT : PRINT " THE DOLDRUMS EXTEND FROM 8.2 DEGREES NOR
TH TO 2.8 DEGREES"
3280 PRINT "SOUTH. IF YOU FINISH A TURN IN THE DOLDRUMS, IT MAY T
AKE"
3290 PRINT "MONTHS TO GET OUT BECAUSE OF LIGHT WINDS."
3300 PRINT : PRINT " THE COMPUTER CONSIDERS ANY POSITION BETWEEN
120 AND 123"
3310 PRINT "DEGREES WEST AND 24.6 TO 32.8 DEGREES NORTH TO BE A S
AFE"
3320 PRINT "ARRIVAL IN SAN FRANCISCO. YOUR POSITION IS AFFECTED B
Y"
3330 PRINT "WIND, CURRENT, LEEMAN, AND YOUR SAIL POSITION."
3520 PRINT "SEE AN ATLAS, GLOBE, OR NAVIGATION CHARTS FOR APPROXI
MATE"
3530 PRINT "DESCRIPTION OF WEATHER CONDITIONS AND CURRENT."
3540 PRINT : INPUT " (PRESS ENTER TO BEGIN) " : A$
3550 RETURN
3999 "COMMANDS
4000 C$=INKEY$
4010 IF C$="Z" THEN C$="P"
4020 IF C$="P" THEN N1C,12)=N1C,12)-1
4030 IF N1C,12)<0 THEN N1C,12)=15
4035 IF C$="/" THEN C$="S"
4040 IF C$="S" THEN N1C,12)=N1C,12)+1
4050 IF N1C,12)>15 THEN N1C,12)=0
4060 IF C$="P" THEN PRINT# 985, " PORT " ;
4070 IF C$="S" THEN PRINT# 985, " STARBOARD " ;
4090 RETURN
4999 "SHORELINE
5000 D=N1C,0)
5010 ON D+1 GOSUB 5100,5110,5120,5130,5140,5150,5160,5170,5180,5
190,5200,5210,5220,5230,5240,5250
5020 PRINT# 576,A$
5090 RETURN
5100 A=D$: U=2 : GOSUB 5700 : A=D$: U=32 : GOSUB 5700 : A=D$: U=61 : GOSUB 57
00 : RETURN
5110 A=D$: U=16 : GOSUB 5700 : A=D$: U=58 : GOSUB 5700 : RETURN
5120 A=D$: U=10 : GOSUB 5700 : A=D$: U=54 : GOSUB 5700 : RETURN
5130 A=D$: U=6 : GOSUB 5700 : A=D$: U=48 : GOSUB 5700 : RETURN
5140 A=D$: U=2 : GOSUB 5700 : A=D$: U=32 : GOSUB 5700 : A=D$: U=61 : GOSUB 57
00 : RETURN
5150 A=D$: U=16 : GOSUB 5700 : A=D$: U=58 : GOSUB 5700 : RETURN
5160 A=D$: U=10 : GOSUB 5700 : A=D$: U=54 : GOSUB 5700 : RETURN
5170 A=D$: U=6 : GOSUB 5700 : A=D$: U=48 : GOSUB 5700 : RETURN
5180 A=D$: U=2 : GOSUB 5700 : A=D$: U=32 : GOSUB 5700 : A=D$: U=61 : GOSUB 57
00 : RETURN
5190 A=D$: U=16 : GOSUB 5700 : A=D$: U=58 : GOSUB 5700 : RETURN
5200 A=D$: U=10 : GOSUB 5700 : A=D$: U=54 : GOSUB 5700 : RETURN
5210 A=D$: U=6 : GOSUB 5700 : A=D$: U=48 : GOSUB 5700 : RETURN
5220 A=D$: U=2 : GOSUB 5700 : A=D$: U=32 : GOSUB 5700 : A=D$: U=61 : GOSUB 57
00 : RETURN
5230 A=D$: U=16 : GOSUB 5700 : A=D$: U=58 : GOSUB 5700 : RETURN
5240 A=D$: U=10 : GOSUB 5700 : A=D$: U=54 : GOSUB 5700 : RETURN
5250 A=D$: U=6 : GOSUB 5700 : A=D$: U=48 : GOSUB 5700 : RETURN
5700 D=AAA
5710 IF Q3 THEN 5790
5720 B=SQR(4-Q)
5730 I=ATN(B/A)
5740 IF I32 THEN I=2
5750 I=INT(I*32)
5780 GOSUB 5800
5790 RETURN
5800 Y=U-I/2+U+I
5805 IF A1 THEN AA=10-10A : Y=Y-AA : Z=I+AA
5810 IF Y364 AND Z364 THEN 5890
5820 IF Y1 AND Z1 THEN 5890
5830 IF Y1 THEN Y=1
5840 IF Z364 THEN Z=64
5850 IF U32 AND Z364 THEN Z=U+8
5860 IF U32 AND Z364 THEN Z=U+8
5870 L$="": IF V33 THEN L$="V": IF V7 AND H32 THEN L$="H"
5875 IF V310 AND A=DS THEN L$="A"
5880 GOSUB 5900
5890 RETURN
5900 A=Z-Y : B$="" : FOR B=1 TO A : B$=B$+L : NEXT L : A$="" : A$=B$
5910 A$=LEFT$(A$,Y-1)
5920 A$=RIGHT$(A$,64-I)
5930 A$=A$+B$+A$
5990 RETURN
6999 "DETERMINE REGION AND OCEAN CURRENTS
7000 H=N1C,1) : V=N1C,2) : N1C,6)=N1C,7)=0 : IF V2.5 THEN 7100
7010 N1C,4)=1
7020 IF V2 AND H30 AND H45 THEN N1C,6)=1.9 : N1C,7)=-.2
7030 IF H45 THEN N1C,6)=-.4 : N1C,7)=-.8
7040 IF H14 AND H18 THEN N1C,7)=1
7090 GOTO 7490
7100 IF V3 THEN 7200
7110 N1C,4)=2
7120 IF V3.6 THEN N1C,6)=-1.2 : GOTO 7190
7130 IF H15 AND H20 THEN N1C,7)=.7
7140 IF H32 AND H37 THEN N1C,7)=-1
7190 GOTO 7490
7200 IF V3.6 THEN 7300
7210 N1C,4)=3
7220 IF H45 THEN N1C,6)=1.3
7290 GOTO 7490
7300 IF V39 THEN 7400
7310 N1C,4)=4
7320 IF V47 THEN N1C,6)=-2.1 : GOTO 7390
7330 IF H42 AND H32 THEN N1C,7)=1.5
7340 IF H48 THEN N1C,7)=-2
7350 IF H24 AND H31 THEN N1C,7)=-1.8
7390 GOTO 7490
7400 N1C,4)=5
7410 IF V310.8 THEN N1C,6)=2.2 : GOTO 7490
7420 IF H27 AND H37 THEN N1C,7)=-1.8
7430 IF H37 AND H41 THEN N1C,7)=1.4
7490 RETURN
7499 "WEATHER BY REGION
7500 W(1,2)=RND(6)-1 : IF W(1,1)>30 THEN W(1,2)=-W(1,2)
7510 A=ABS(W(1,2)) : W(1,3)=RND(7) : RND(15)-1 : W(1,4)=RND(1
6)-1
7520 W(2,2)=RND(6)-1 : IF W(2,1)>29.5 THEN W(2,2)=-W(2,2)
7530 A=ABS(W(2,2)) : W(2,3)=RND(5) : RND(15)-1 : IF W(2,3)>10 THEN W(2,
3)=W(2,3)+RND(15)
7535 W(2,4)=2+RND(6)-RND(6) : IF W(2,4)<0 THEN W(2,4)=W(2,4)+16
7540 W(3,2)=RND(3)-1 : IF W(3,1)>29 THEN W(3,2)=W(3,2)
7550 A=ABS(W(3,2)) : W(3,3)=RND(3) : A+RND(3)-1 : W(3,4)=RND(16)-1
7560 W(4,2)=RND(6)-1 : IF W(4,1)>30 THEN W(4,2)=-W(4,2)
7570 A=ABS(W(4,2)) : W(4,3)=RND(6) : A+RND(6)-RND(6) : IF W(4,
4)<0 THEN W(4,4)=15
7575 IF W(4,3)<10 THEN W(4,3)=W(4,3)+RND(21)-1
7580 W(5,2)=RND(3)+2 : IF W(5,1)>29.7 THEN W(5,2)=-W(5,2)
7590 A=ABS(W(5,2)) : W(5,3)=13+RND(7) : A+RND(5,4)=1+RND(6)-RND(6) : I
F W(5,4)>15 THEN W(5,4)=W(5,4)-16
7595 FOR A=1 TO 5 : W(A,1)=W(A,1)+W(A,2)/7 : NEXT A : RETURN
7599 "CURRENT PLAYER'S WEATHER
7600 R=N1C,4) : I=N1C,6) : W(R,1)
7610 N1C,9)=W(R,2)/50
7620 N1C,10)=W(R,3)

```

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```

7630 N(C,11)=W(R,4)
7690 RETURN
7699 'HOURLY CHANGE IN WEATHER
7700 N(C,8)=N(C,8)+N(C,9)
7710 N(C,10)=N(C,10)+RND(3)-2:IF N(C,10)<0 THEN N(C,10)=0
7720 IF N(C,8)<28 AND N(C,9)<-0.9 THEN N(C,10)=N(C,10)+RND(5):A=R
ND(12):IF (A<CL):10 THEN N(C,9)=N(C,9)
7730 N(C,11)=N(C,11)+RND(3)-2
7740 IF N(C,11)>15 THEN N(C,11)=0
7750 IF N(C,11)<0 THEN N(C,11)=15
7790 RETURN
7999 'VIEW FROM BOW
8000 CLS
8010 FOR A=16128TD16382:POKE A,191:NEXT
8020 FOR A=16139TD16146:POKE A,128:POKE A+32,128:NEXT
8030 POKE 16095,190:POKE 16096,189
8040 GOTO 2000
8050 IF T(C,2)=1 GOSUB 8100
8060 IF T(C,2)=2 GOSUB 8150
8070 S(C,1)=T(C,1)
8080 S(C,2)=T(C,2)
8090 RETURN
8099 'SAIL FOR STARBOARD TACK
8100 X=6+T(C,1):FOR B=15392TD15904 STEP 64:FOR A=B TO B+POKE A
,191:NEXT A:X=X+1:POKE B-X,186
8110 NEXT B:RETURN
8149 'SAIL FOR PORT TACK
8150 X=6+T(C,1):FOR B=15392TD15904 STEP 64:FOR A=B TO B+POKE A
,191:NEXT A:X=X+1:POKE B-X,181
8160 NEXT B:RETURN
8199 'WAVES
8200 W=M+1:IF M=4 THEN M=1
8210 PRINT# 640,W*(W)/W*(W):W*(W)/W*(W);
8220 W*(0)=LEFT$(W*(W)+1,15)
8230 PRINT# 704,W*(W+1):W*(0):PRINT# 737,W*(0):W*(W+1);
8240 W*(0)=LEFT$(W*(W)+2,8)
8250 PRINT# 779,W*(0):PRINT# 811,W*(0);
8260 GOSUB 4000
8290 RETURN
8299 'DATA DISPLAY
8300 D=N(C,0):PRINT# 862,D*(D);
8310 PRINT# 985,C*(C);
8320 PRINT# 896,"WIND ";
8330 PRINT# 960,D*(N(C,11));
8340 B$="### KNOTS "
8350 PRINT USING B$;N(C,10);
8390 RETURN
8399 'LAND TEST - C(0)=LAND NEARBY 1=M 2=E 3=S 4=W
8400 H=N(C,1):V=N(C,2):Z=INT(H):Y=INT(V)
8410 DW=M*DN+V*DE=64-H:DS=13-V
8419 'NORTH BOUNDARY
8420 IF H(16 OR H)44 THEN 8550
8430 IF H(44 THEN DN=V-8
8435 IF H(42 THEN DN=V-9
8440 IF H(38 THEN DN=V-10
8450 IF H(35 THEN DN=V-12
8460 IF H(33.5 THEN DN=V-11
8465 IF X(50 AND I(34 THEN DN=V-11
8470 IF H(31 THEN DN=V-8
8475 IF H(29 THEN DN=V-6
8480 IF H(27 THEN DN=V-5
8485 IF H(20 THEN DN=V-(X-15)
8490 IF H(24 OR V)8 THEN 8550
8499 'EASTERN ATLANTIC
8500 IF X(44 THEN DN=V*DS=6-V
8505 IF X(39 THEN DN=V
8510 IF X(39 THEN DN=V-1
8520 IF X(35 THEN DN=V-2
8530 IF X(41 AND X(45 THEN DS=7-V
8549 'WEST COAST
8550 IF H(32 THEN 8600
8555 IF Y=12 THEN 8690
8560 IF Y(5 THEN DE=(15+Y)-H:GOTO 8690
8570 IF Y=11 THEN DE=33.5-H
8575 IF Y(11 THEN DE=31-H
8580 IF Y(8 THEN DE=29-H
8585 IF Y=5 THEN DE=27-H
8590 GOTO 8690
8599 'EAST COAST
8600 IF Y(12 THEN DN=H-36
8610 IF Y=9 THEN DN=H-38
8620 IF Y=8 THEN DN=H-42
8630 IF Y=7 THEN DN=H-44
8640 IF Y=6 THEN DN=H-43
8650 IF Y=5 THEN DN=H-36
8660 IF Y(5 AND Y)1 THEN DN=H-33.5
8665 IF Y=1 THEN DN=H-35
8670 IF Y=0 THEN DN=H-39
8680 GOSUB 8200
8690 FOR A=0TD4:C(A)=0:NEXT
8700 IF DN(2 THEN C(1)=1:C(0)=1
8710 IF DE(2 THEN C(2)=1:C(0)=1
8720 IF DS(2 THEN C(3)=1:C(0)=1
8730 IF DN(2 THEN C(4)=1:C(0)=1
8740 A$="":FOR A=1TD4:A$=A$+"":NEXT:IF C(0)=0 THEN 8790
8750 GOSUB 8200:GOSUB 5000
8760 IF DN(0 OR DE(0 OR DS(0 OR DN(0 THEN 2200
8790 RETURN
8999 'MAP
9000 CLS:A=15360
9010 POKE A+18,162:FOR B=A+17TD A+33:POKE B,191:NEXT:POKE A+34,15
1:FOR B=A+35TD A+37:POKE B,143:NEXT:POKE A+38,142
9020 A=A+64:POKE A+17,139:FOR B=A+18TD A+32:POKE B,191:NEXT:POKE A
+33,159:POKE A+34,159
9030 A=A+64:POKE A+18,162:FOR B=A+19TD A+32:POKE B,191:NEXT:POKE
A+33,157
9040 A=A+64:POKE A+19,131:FOR B=A+20TD A+25:POKE B,191:POKE B+6,1
43:NEXT:POKE A+20,175:POKE A+21,175:POKE A+28,135:POKE A+32,175:
POKE A+33,145
9050 A=A+64:POKE A+21,133:POKE A+22,143:POKE A+23,143:FOR B=A+24
TD A+26:POKE B,191:NEXT:POKE A+33,130
9060 A=A+64:POKE A+26,139:POKE A+27,173:FOR B=A+29TD A+38:POKE B
,176:NEXT
9070 A=A+64:FOR B=A+28TD A+41:POKE B,191:NEXT:POKE A+42,180:POKE
A+43,144
9080 A=A+64:POKE A+28,138:FOR B=A+29TD A+43:POKE B,191:NEXT
9090 A=A+64:FOR B=A+31TD A+36:POKE B,191:POKE B+64,191:POKE B+128
,191:POKE B+5,191:NEXT:POKE A+41,143:POKE A+42,135
9100 A=A+64:POKE A+37,131
9110 A=A+64:POKE A+36,128
9120 A=A+64:POKE A+33,131:POKE A+32,191:POKE A+33,191:POKE A+34,
181:POKE A+35,148
9130 PRINT# N(1,3),"C";PRINT# N(2,3),"F";PRINT# N(3,3),"S";PR
INT# 99,"M";PRINT# 145,"S";
9140 PRINT# N(C,3),"I";
9150 PRINT# 832,"CLIPPER";C(C(1));" ";
9170 PRINT# WINDS;"D*(N(C,11)): AT";N(C,10);" KNOTS"
9230 PRINT# 896,"1-N 2-M 3-E 4-SE 5-S 6-SW 7-W 8-NW"
9240 PRINT# 960,"CAPTAIN, WHAT HEADWIND DO YOU WISH (0-8)";
9250 AS=INKEY$:IF AS="" THEN 9250
9252 IF AS="N" THEN AS="1"
9253 IF AS="E" THEN AS="3"
9254 IF AS="S" THEN AS="5"
9255 IF AS="W" THEN AS="7"
9260 A=VAL(AB):IF (A(1)OR(A)8) THEN 9250
9270 N(C,12)=(A-1)*2
9490 RETURN
9999 GOTO 9999
10000 DATA " N ",0,-1,"NNE",.4,-.9," NE",.7,-.7,"ENE",.9,-.4
10010 DATA " E ",1,0,"ESE",.9,.4," SE",.7,.7,"SSE",.4,.9
10020 DATA " S ",0,1,"SSW",-.4,.9," SW",-.7,-.7,"WSW",-.9,.4
10030 DATA " W ",1,0,"WNW",-.9,-.4," NW",-.5,-.7,"NNW",-.4,-.9
10040 DATA " CHALLENGE ",FLYING CLOUD," SURPRISE "

```



Space invaders in 1K cause plenty of headaches to a conscientious laser base determined to survive.

Tim Bull's Cosmax aliens come in four different varieties depending on the player's score. When you score above 1,000 points you find yourself up against a second generation alien.

Another mutation takes place at 2,000 points. The fourth variety are at liberty to drop on you at any time and being "semi-invisible", they carry a bonus of 50 points.

You are rewarded for an early strike on the descending creatures as they are worth 100 points to you at the top of the screen but only five if you leave them to the last moment.

To destroy the creatures you move your laser base so that one of its two guns, mounted at either end, is directly below the centre of the alien. The "1" key moves the base left and the "3" key moves it right.

To fire press the "0" key. The guns fire invisible laser rays when key is pressed.

Only one life in this game though and the first alien to hit your base puts an end to your score. Tim has some ideas which will help games writers working with limited memory.

In lines 10-30 the "VAL" function is used to set up variables since it takes up less memory. Lines 50 to 80 determine which type of alien will come down the screen next. Note that the

middle character between the quote in line 60 is a reversed quote character.

Line 90 determines the initial height of the alien and line 120 tests whether the alien is above one of the two laser base's guns and whether the "fire" button is being pressed — if both conditions are fulfilled control jumps to line 250.

Lines 130 and 140 move the laser base. 150 and 160 move the alien and keep it on the screen. Line 180 tests whether the alien has hit your laser base and line 200 prints an explosion and your score.

The variables used are A\$ alien type; H, horizontal position of alien; P, position of laser base; S, score; V, vertical position of alien.

## COSMAX program listing

```

5 RAND
10 LET K = VAL "2"
20 LET S = VAL "0"
30 LET P = VAL "8"
40 LET H = INT (RND*18)
50 LET A$ = "<V>"
60 IF S>1E3 THEN LET A$ =
 "███"
70 IF S>2E3 THEN LET A$ =
 "████"
80 IF RND >.8 THEN LET A$ =
 "":
90 FOR V = INT(RND*15) TO 19
100 CLS
110 PRINT AT V, H-1; A$: AT
 20, P-K; "███"
120 IF ABS (P-H) = K AND
 INKEY$="0" THEN GOTO 250
130 IF INKEY$ = "1" THEN LET
 P = P-(P>K)
140 IF INKEY$ = "3" THEN LET
 P = P+(P<15)
150 LET H = H+INT(RND*3)-1
160 LET H = H+(H<K)-(H>16)
170 NEXT V
180 IF ABS (P-H)>3 THEN
 GOTO 40
190 CLS
200 PRINT AT 19, P-3; "X X X":
 AT 20, P-3; "XXXXX": AT 7, K;
 "GAME OVER": S
210 PAUSE 40000
220 POKE 16437, 255
230 RUN
250 PRINT AT V, H-K;
 ">x█x<"
260 LET S = S+100-V*5+50*
 (CODE A$ = 14)
270 GOTO 40

```

COSMAX RUNS ON A SINCLAIR ZX81 IN 1K.

# COSMAX

BY TIM BULL



**PET**

**THIS CUBE SOLVING PROGRAM RUNS IN 16K ON A 40 COLUMN PET**

**BY PETER AND MATTHEW RICHARDS**



# SOLVE THE CUBE!

Cubism is more popular today than Picasso would ever have thought possible.

But if watching 10-year-olds solve Mr. Rubik's little box of tricks on the T.V. screen in ever decreasing times, is getting you down, then go one better and tell people you got your Pet to solve it.

This program enables anyone to solve the cube by giving them a precise list of rotations to carry out. Rather than calling for information at various stages during the solution, the program issues a complete solution from the initial data. The computer holds the state of the entire cube as it manipulates it internally until it reaches the final solution. The would-be solver has only to enter the original pattern of colours on each face of the cube.

The solution is printed on the screen and the solver can manipulate the cube directly from this information. If required he can also have the list or rotations output to a standard printer by simply replying "yes" to the question "WILL YOU WANT THE SOLUTION TO BE OUTPUT TO A PRINTER?"

The program holds the state of the cube, after every move is made, in "percent" (integer) variables, namely E% and C%. This saves memory, since one element of a subscripted "percent"

variable takes up only 2 bytes, but this is sufficient as only integers are involved.

The program itself takes up about 8K of RAM, but the variables bring the total of memory needed to about 11K. It was designed for Pets with Basic 2 or 3 but will also work on a Basic 4 machine with 40 columns.

The part of the program before line 1000 prints the instructions and sets up the subscripted variables. The part from 1000 to 4900 works out, in stages, what rotations are necessary to solve the cube.

As each stage is completed the instructions are put into a string, M\$, and the program jumps to a subroutine at 5000 which prints out these instructions and rearranges the cube in the memory in preparation for the next stage. It then returns to the main part of the program and continues this procedure until it "sees" that the cube is finally complete and prints FINIS.

The program is written with the rotation instructions based on the suffixes "—" and "2", but when it comes to printing out the instructions a notation based on lower case letters is used, as this is a more convenient notation for the solver to follow. The solution usually runs to about 100 rotations and a specimen printout is shown.



# SOLVE THE CUBE!

62 COMPUTER &amp; VIDEO GAMES



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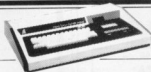
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```

1340 A=B:IFCZ(1,B,FNA(B-1),FNA(B-1))=0THENM#="N-1B-1N":GOSUB5000:GOTO1370
1350 IFCZ(1,B,FNA(B-1),5)=0THENM#="EB2E-1B-1":GOSUB5000
1360 M#="EBE-1":GOSUB5000
1370 NEXTB
1375 D#="B-1E-1BESB-1S-1"
1380 FORB=1T04
1390 FORR=1T05:FORS=1T05
1400 IFEZ(R,S,R)=BTHENIFEZ(R,S,S)=FNA(B-1)THENE=R:F=S
1410 NEXT: NEXT
1420 IFE=BNDF=FNA(B-1)THEN1590
1430 IFE=5ORF=5THEN1470
1435 IFF=FNA(E+1)THENA=E:GOTO1450
1440 A=F
1450 M#=D#:GOSUB5000
1460 GOTO1390
1470 IFE=5THENQ=F:GOTO1485
1480 Q=E
1485 GT=EX(E,F,Q)
1490 BR=FNA(E+F-GT)-1
1500 ONBR+1GOTO1550,1510,1520,1530
1510 M#="B":GOTO1540
1520 M#="B2":GOTO1540
1530 M#="B-1"
1540 GOSUB5000
1550 A=FNA(GT-1)
1560 IFGT=BTHENM#=D#:GOTO1580
1570 M#="BWB-1W-1B-1S-1BS"
1580 GOSUB5000
1590 NEXTB
1600 R=0:FORB=1T04
1610 BB=FNA(B-1)
1615 J(B)=0
1620 IFCZ(1,B,BB,B)*CZ(1,B,BB,B)*CZ(1,B,BB,5)=5*B*BBTHENJ(B)=1:R=R+1
1630 NEXT
1640 ONR+1GOTO1655,1680,1650,0,1750
1650 IFJ(1)=J(3)THEN1660
1655 M#="B":GOSUB5000:GOTO1600
1660 A=2-J(2)
1670 M#="BSWB-1B-1S-1":GOSUB5000:GOTO1600
1680 FORB=1T04:IFJ(B)=1THENA=B
1690 NEXT
1700 S=CZ(1,A,FNA(A+1),5)*CZ(1,A,FNA(A+1),A)*CZ(1,A,FNA(A+1),FNA(A+1))
1710 IFS=5*A*FNA(A-1)THENM#="W-1EB-1WB-1B-1":GOTO1730
1720 M#="EBB-1W-1BE-1B-1W"
1730 GOSUB5000:GOTO1600
1750 R=0:FORB=1T04
1755 BB=FNA(B-1)
1760 J(B)=0
1770 IFCZ(1,B,BB,5)=5THENJ(B)=1:R=R+1
1780 NEXT
1790 ONR+1GOTO1850,1830,1800,0,1900
1800 IFJ(1)=J(3)THEN1820
1810 A=J(4)*2+J(3)-J(4)*(J(3)*2-1)+1:GOTO1860
1820 A=J(3)+1:GOTO1860
1830 FORB=1T04:IFJ(B)=1THENA=FNA(B-1)
1840 NEXT:GOTO1860
1850 A=3
1860 IFCZ(1,FNB(3),FNB(2),FNB(2))=5THENM#="W-1TWSTG-1BST-1S-1W-1T-1WB-1":GOTO18
80
1870 M#="BW-1TWSTG-1B-1ST-1S-1W-1T-1W"
1880 GOSUB5000:GOTO1750
1900 R=0:A=3:FORB=1T04
1920 IFEZ(5,B,5)*EX(5,B,B)=5*BTHENA=B:R=R+1
1930 NEXT
1940 ONR+1GOTO1970,1960,0,0,2000

```



# SOLVE THE CUBE!

```

1960 IFEX(5,FNB(2),FNB(2))*EX(5,FNB(2),5)=5*FNB(4) THENM#="W2BSN-1W2NS-1B42":GOT
01980
1970 M#="W2B-1SN-1W2NS-1B-1W2"
1980 GOSUB5000:GOTO1900
2000 R=0:A=2:FORB=1TO4
2010 J(B)=0
2020 IFEX(5,B,5)=5 THENJ(B)=1:R=R+1
2030 NEXT
2040 ONR+1GOTO2080,0,2050,0,3000
2050 IFJ(1)=J(3) THEN2070
2060 A=J(3)*2+J(2)-J(3)*(J(2)*2-1)+1:M#="SBT-1E2B2T2WBW-1T2B2E2TB-1S-1B-1":GOTO
2090
2070 A=2-J(1)
2080 M#="SBT-1E2B2T2WBW-1T2B2E2TB-1S-1B2"
2090 GOSUB5000:GOTO2000
3000 IFEE=120REE=25 THENPRINT:IFPP=1 THENPRINT#4
3005 PRINT"2-1-1-1":IFPP=1 THENPRINT#4,"2-1-1-1":CLOSE4
4900 END
5000 IFM#="" THENRETURN
5010 R#=-LEFT$(M#,1)
5015 IFR#=-M# THEN5030
5020 IFASC(MID$(M#,2))<64 THENR#=-LEFT$(M#,12-ASC(MID$(M#,2)))/5)
5030 M#=-MID$(M#,LEN(R#)+1)
5040 FORU=0TO5:IFASC(R#)=FNF(U) THENL=FNB(U)
5050 NEXTU
5054 IFPP=1 THENPRINT#4,"1"CHR$(FNF(L));
5055 PRINTCHR$(FNF(L)+128);
5056 EE=EE+1
5057 IFLen(R#)=2 THENSF#="2":GOTO5059
5058 SF#=-MID$(T#,L#2+1+LEN(R#)/2,1)+" "
5059 PRINTSF#;:IFPP=1 THENPRINT#4,"M"SF#;
5061 IFEE=13 THENPRINT:IFPP=1 THENPRINT#4
5062 IFEE=26 THENPRINT"M":EE=0:IFPP=1 THENPRINT#4:PRINT#4
5065 FORLP=1TOLEN(R#)
5070 A(0)=-4*(L=0ORL=5):A(4)=A(0)
5080 A(1)=FNA(L-1+2*(L=0)+L=5))
5090 A(2)=5+3*(L=0ORL=5)
5100 A(3)=FNA(L+1+2*(L=0)+L=5))
5105 FORLK=0TO4:B(LK)=A(LK):NEXT
5112 E1=EX(L,A(3),L)
5114 E2=EX(L,A(3),A(3))
5120 FORTN=3TO1STEP-1
5130 EX(L,A(TN),L)=EX(L,A(TN-1),L)
5140 EX(L,A(TN),A(TN))=EX(L,A(TN-1),A(TN-1))
5150 EX(A(TN),L,A(TN))=EX(A(TN-1),L,A(TN-1))
5160 EX(A(TN),L,L)=EX(A(TN-1),L,L)
5170 NEXTTN
5175 EX(L,A(0),L)=E1:EX(A(0),L,L)=E1
5180 EX(L,A(0),A(0))=E2:EX(A(0),L,A(0))=E2
5190 IFL=0 ANDL<5 THENA(0)=L:A(4)=L:A(2)=L
5200 T=-L=5)
5210 C1=CX(T,A(3),A(0),L)
5215 C2=CX(T,A(3),A(0),B(3))
5220 C3=CX(T,A(3),A(0),B(0))
5230 FORTN=3TO1STEP-1
5240 T1=-((TNC3ANDL=0)ORL=5)
5250 T2=-((TNC1ANDL=0)ORL=5)
5260 CX(T1,A(TN+1),A(TN),L)=CX(T2,A(TN),A(TN-1),L)
5270 CX(T1,A(TN),A(TN+1),L)=CX(T2,A(TN-1),A(TN),L)
5280 CX(T1,A(TN+1),A(TN),B(TN))=CX(T2,A(TN),A(TN-1),B(TN-1))
5290 CX(T1,A(TN),A(TN+1),B(TN))=CX(T2,A(TN-1),A(TN),B(TN-1))
5300 CX(T1,A(TN),A(TN+1),B(TN+1))=CX(T2,A(TN-1),A(TN),B(TN))
5310 CX(T1,A(TN+1),A(TN),B(TN+1))=CX(T2,A(TN),A(TN-1),B(TN))
5320 NEXTTN
5330 CX(T,A(0),A(1),L)=C1:CX(T,A(1),A(0),L)=C1
5340 CX(T,A(0),A(1),B(0))=C2:CX(T,A(1),A(0),B(0))=C2
5350 CX(T,A(0),A(1),B(1))=C3:CX(T,A(1),A(0),B(1))=C3
5360 NEXTLP
5370 GOTO5000

```



# Kit Korner

## TROUBLE SHOOTING ZX81

THIS year Sinclair has flooded the home computer market with the ZX81, giving almost everyone the chance to break into this fascinating field. Despite the low cost of a ready-built ZX81, the saving offered on the kit has tempted many with no constructional experience whatsoever, to chance their luck.

Unfortunately a simple fault or problem can be very off-putting for the beginner, so I am going to give you a few points to look out for before and after construction. Many of these have come up on the ZX81 but most apply to all kits.

To begin with, the ZX81 has been designed to fit into as small a case as possible. Consequently the board layout is a little more muddled than some I have come across and requires careful checking.

If you bought a kit before June of this year the first thing to look out for is an incorrect component listing. An errata was supposed to have been included but many kits went out without one. The circuit diagram if you can follow it shows that R3 and R6 must be swapped over, i.e. R3 — not used and R6 — 2K2. Also R15 should read 220K but this is not crucial and works well with the 1K0 resistor suggested on the components list.

If there is a circuit diagram as well as a component list with any kit, check one against the other and if there is a discrepancy find out which is correct before proceeding. It will save you time and trouble in the long run.

As I mentioned before, always take care when soldering in components, especially transistors, to prevent overheating. Two transistors are supplied with the ZX81, TR1 and TR2. Both are ZTX313's, which are very small physically, and proved a real problem to even the skilled kit builders. The effects of overheated transistors are distorted characters or no picture at all. For those who think they may

have damaged their's the direct equivalent to the ZTX313 is the 2N2369.

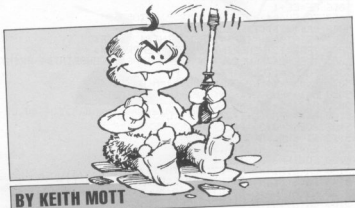
Take care this time to mount the transistors at least a quarter-of-an-inch above the board and solder lightly. Also make sure that you have put the transistor in the right way round as the pin layout may be different.

Another problem I found, even with ready-built versions, was the keyboard connector. Initially the connectors are very stiff but after a few insertions it becomes easier, although you must still take care not to crease the keyboard tails. If the ZX81 will not accept inputs from the keyboard check this point first,

the regulator will overheat and may even cut out after a time. This will not harm the circuit for as soon as the regulator has cooled down it will return to operation, but it is annoying if you have just entered in a long program.

To cure this I cut out a larger heat sink from a piece of 12 gauge aluminium sheeting, which sits all the way across the front of the board, as I sometimes use a power supply of 14.5 volts, i.e. a spare car battery. Of course you must never run a computer off a battery in a running car!

There is one precaution you should take to prevent "blowing up" chips. This can occur when a



BY KEITH MOTT

even if yours is ready-built. It may have been shaken loose in transport.

One trick I had to learn was to cut the tails, having fractured one of the tracks through creasing, and carefully scrape away the insulation on the right side to make contact again. This is a last resort as a creased tail is not a serious problem unless you intend to take the ZX81 apart often. However, send the ZX81 back for a replacement if the fault is in the keyboard itself.

When specifying the kit version you are given the option of buying the power supply which is recommended. If, however, you decide to use your own, be warned that if it gives more than 12 volts, which is permitted by the regulator but not by Sinclair,

static charge accumulates on one or more of the pins of the chip. To prevent this, touch something earthed, like a water tap or some large item of electrical equipment, such as a washing machine or cooker, before going to work. Also touch the chips as little as possible. Dirty pins are as difficult as open circuits to trace.

Fortunately the ZX81 comes with a circuit and layout diagram as well as a corrected component list. The board, even in its muddled design, has a helpful layout printed on it, as so many do these days, with the component number nearby. Build it correctly and carefully as instructed, as you will be very lucky to find the faults afterwards!



# ingenious!

...that's the only word to really describe microcomputer system, the home compatible with the TRS 80, and ideal for enthusiasts, especially the committed Genie has now been upgraded to Genie I, incorporating all the

- Extended BASIC, including RENUMBER and SCREEN PRINT
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- Genie I has all of this, plus the built-in cassette deck, 16K RAM, 12K ROM with BASIC interpreter, full-size keyboard, an extremely wide range of new and updated peripherals, and literally 2000's of pre-recorded programmes available. Yet, almost unbelievably, the price of Genie I is even lower than that of the original Genie.

the superb Genie computer which is all micro-hobbyist.

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The Genie II is a major breakthrough for small business computers. Harnessing all the advantages of Genie I, including low price, Genie II adapts perfectly to commercial functions with the following features:

- Numeric keyboard
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## New!...12" Monitor

Now, a choice of 2 monitors giving a clear easy to read image. The updated EG101 has a new green phosphor tube.



## New!...Expander

An updated Expansion Box (EG 3014) is a major feature of the new Genie I system, and unleashes all its possibilities, allowing for up to 4 disk drives with optional double density II connects to a printer, or RS232 interface or SIOO cards. There is 16K RAM fitted and it has a new low price!

## New!...Printer

The EG 603 printer can be connected to the Genie either through the expander or directly into the computer using the Parallel Printer Interface. It is a compact unit, with an 80 column, 5 x 7 matrix print-out, operating quietly and efficiently at 30 characters per second.



## Disk Drive

As well as the obvious advantage of mass storage, the addition of the disk system to the Genie means much faster access to other languages and full random access file handling. Up to 4 of these 40 track drives can be used on a system.



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A choice of four different skill levels, generate the game's electronic sounds, which form the clues to preventing the big bang. You must also choose the length of fuse wire — the longer the wire, the more time you have to find the correct sequence to stop the bomb from exploding.

## MUSICAL MEMORY TWINS

The design teams of Waddingtons and Adam Imports must have got together to produce their respective versions of the musical memory money-spinner, Simon.

Each is made of the same white and blue plastic casing with four coloured, triangular shaped buttons in the corner of the mould. There's also a circular screen on the top of the game with a grid of nine squares marked on it and circles in the squares corners containing red lights.

The only differences in the physical appearance of the game are the name and each firm's

Le Boom is built to last and it's durable plastic moulding will withstand most violent bangs. If you fail to defuse the thing don't worry, it won't blow you to kingdom-come — but you do get a series of explosion noises imitating the real thing.

Your sense of panic is prompted by the electronic din getting louder as the bang comes closer. The toy is a welcome addition to the range of electronic toys brought out by Oxfordshire based toy manufacturers Action Games and Toys.

In addition it falls into the low end of the electronic games market with the cheap price tag of £14.49 and runs on four MN1300 batteries (not supplied). A good Christmas bargain from most large stores with toy departments.

own logo. The Adam Import version is called Adam Super 11 (pictured) from the company's Grandstand range of electronic toys while the Waddingtons' one goes by the name Wizard.

Both games are for one to four players, with a minimum age of six, on Wizard, and seven on Adam Super 11! Both run off six HP11 batteries (not supplied).

The biggest difference between the two and the most important, is the price. Wizard clocks in at £24.50 but Adam Super 11 comes into its own at a price of £18.95. In some stores it will cost up to £20.95, depending on the manager's discretion.



## GRAND PRIX ON A "SPACESHIP"

If racing cars are more up your street than space vehicles then try one of the electronic versions around.

In this replica of the arcade game you have got two options to go for. Either the player can try a circuit race completing a certain number of laps, or he can race against the clock.

The car is controlled by two small joysticks which alters the car's speed by accelerating and braking, as well as steering the car.

Other cars on the race track are controlled by the microprocessor. The track itself is displayed on an L.C.D. screen divided into three lanes. But the actual body of the game looks more like a space ship than anything remotely to do with formula one racing.

When you opt for the circuit race the computerised game works out the time taken to complete a fixed distance of 800 kilometres. When you're racing against the clock the idea is to cover as many kilometres as possible in 140 seconds.

Points are scored for timings, the number of crashes with other cars, and the whole game comes complete with sound effects of car engines and thunderous crash noises.

A record of your achievements and lap times, number of crashes are kept by the microprocessor at the heart of the game.

It costs £27.95 and is available from Computer Games.

## DESTRUCTION FROM THE DEEP

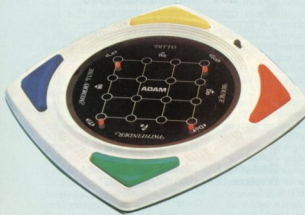
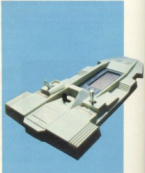
People who prefer shooting down enemy craft under the sea, rather the deepest voids of space, will like a 3-D hand-held game, Torpedo Shoot.

Its neatly shaped body is based on an arcade games machine with a screen at the top. The aim is to destroy the fleet of battleships which sail across the path of a torpedo under your control. Using the two arrow buttons you can manoeuvre the submarine into one of four positions from which to fire at the ships.

This is no ordinary hand-held game though, the screen with its L.C.D. display of red lights is also three dimensional adding depth and reality to the entire game.

Everytime you wipe out a battleship another one comes breezing onto the screen until your time is up. When you manage a direct hit the little machine provides you with accompanying explosion sounds to add to the realism and the target sinks.

Torpedo Shoot is aimed at the over eights and runs off one nine volt battery (not included in the package). It costs £9.83 from Leicestershire-based distributors AA Hales.





The game is one of the more expensive hand-held type at £27.95 and is distributed over here by Computer Games. It runs on two HP11 batteries (not supplied).





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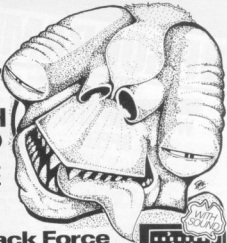
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## WHEN YOU NEED TO SPEED THINGS UP

It is the computer's calculating speed which has made it such a boon to mankind but a good game can often be ruined because a calculation is carried out too slowly.

In microcomputer games, speed is particularly important in moving graphics, where slow processing will give a jerky effect. In strategy games where the computer must calculate to decide its move, a long wait will result in all-too-human boredom.

One important way of speeding up programs is to use tables which allow the computer to look up already calculated values instead of repeating the calculation every time the result is needed.

In its simplest form a "look-up table" is just an array in which each element is the required value corresponding to its index. For example, if we have a pro-

gram which uses the square roots of the numbers from 1 to 10 we could use an array  $R$  dimensioned to 10 with  $R(I)$  equal to the square root of  $I$ . Whenever a square root is needed it can be obtained as  $N=R(I)$ , which is much faster than the calculation  $N=\text{SQR}(I)$ .

As an example of a more complicated look-up table, consider the problem of evaluating hands in five-card draw poker. (You do not need to know the game in order to follow the example, and the method can be applied to other games in which runs and pairs are important.) To avoid making the example too complicated I will ignore flushes and the fact that an ace may be high or low in a straight.

The simplified problem then consists of deciding whether a hand contains high cards only, a pair, two pairs, three of a kind, a full house (three of a kind and a pair), four of a kind, or a straight (five consecutive cards).

It would be possible to write separate routines for testing each possible case but this is likely to be very slow. It is not immediately obvious how we

can use a table to solve this problem; the key is to arrange the cards in ascending order and look at the differences between the cards.

A difference of zero means two cards of the same value, a difference of one means two consecutive cards, while a difference greater than one means that the two cards cannot contribute to pairs or a straight.

To make this clearer, let us look at a few hands:

2, 3, 3, 5, 6 differences 1, 0, 2, 1  
2, 3, 3, 3, 6 differences 1, 0, 0, 3  
2, 2, K, K, K differences 0, 11, 0, 0  
4, 5, 6, 7, 8 differences 1, 1, 1, 1

In the first hand we have a pair — a single difference of zero; in the second hand we have three of a kind — two consecutive differences of zero; in the third hand we have a full house — a single non-zero difference; in the fourth hand we have a straight, and four differences of one. The pattern of zeros, ones and numbers greater than one — can be seen to be related to the type of hand.

We can obtain a single number from the four differences by replacing all differences greater than one by two (as the actual value of the difference is irrelevant to this type of hand) and regarding the differences as



the digits of a ternary (a base 3 rather than decimal) number. Thus, the four hands above give:  
 ternary 1021 = decimal 34  
 ternary 1002 = decimal 29  
 ternary 0200 = decimal 18  
 ternary 1111 = decimal 40

If the five cards in the hand, in ascending order, are in the array C, the following simple routine will calculate the index for the hand:

```
100 LET I = 0
110 FOR N = 2 TO 5
120 LET D = C(I) - C(I-1)
130 IF D > 2 THEN LET D = 2
140 LET I = 3*I + D
150 NEXT N
```

The value of I calculated by this routine can be used to access an array of dimension 80 containing code numbers corresponding to the type of hand, and these code numbers can then be used to select routines which further refine the valuation of the hand according to the values of the cards.

## PRINTING WITHOUT BEING DAMNED

The PRINT statement, like almost everything in Basic, is subject to numerous dialect variations. Some of the variations can be seen if we consider how we might arrange to print at different places on the screen without changing anything except where we are actually printing.

The current print position is marked on the screen by a cursor, and the cursor location is stored in memory where the Basic interpreter can find it. It is possible to change the print position by POKE-ing the different values into the cursor location, but most Basics provide other methods.

The most direct method is found on the Sinclair ZX81, with PRINT AT, and on the TRS-80, with PRINT @. These allow the print position to be set immediately to any part on the screen. The POSITION statement on the Atari machines works in a similar fashion, while on the Apple II the TAB and VTAB functions set the horizontal and vertical posi-

tion separately. The Pet has keys for cursor up, down, left and right, and these commands can be incorporated into PRINT lists.

It is usually necessary, when using cursor control functions, to keep track of the cursor position. Some Basics provide a function POS which returns the current cursor position, but even without the POS function it is quite simple to use variables to record the cursor position.

All these methods of shifting the print position can be simulated by POKE-ing to a memory-mapped screen. If the screen has M rows and N columns, and the memory location corresponding to the top left-hand corner has address S, then the address for row R and column C is easily seen to be  $S + N*(R-1) + C-1$ . To print a string  $XS$  starting at R,C we can use the following routine:

```
1000 LET Z = S + N*(R-1) + C-1
1010 FOR W = 1 TO LEN(XS)
1020 POKE Z+W-1,
ASC(MID$(XS, W, 1))
1030 NEXT W
1040 RETURN
```

The equivalent to PRINT AT X,Y, "MESSAGE"; is

```
100 LET R = X
110 LET C = Y
120 LET MS = "MESSAGE"
130 GOSUB 1000
```

The routine can easily be modified to print vertically instead of horizontally (this is not provided in most Basics).

```
1000 LET Z = S + N*(R-1) + C-1
1010 FOR W = 1 TO LEN(XS)
```

```
1020 POKE Z + (W - 1)*N,
ASC(MID$(XS, W, 1))
1030 NEXT W
1040 RETURN
```

The above routines do not alter the simulated print position, so that:

```
200 LET MS = "SECOND MESSAGE"
210 GOSUB 1000
would overwrite the first message. To cause a second message to be printed after the first we can add the following lines to the first routine
1022 LET C = C+1
1024 IF C > N+1 THEN GOTO 1030
1026 LET C = 1
1028 LET R = R+1
```

With this modification we can simulate cursor up, down, left, right as follows:

```
Cursor up: LET R = R-1
Cursor down: LET R = R+1
Cursor left: IF C > 1 THEN
C=C-1 ELSE C=N; R=R-1
Cursor right: IF C < N THEN
C=C+1 ELSE C=1; R=R+1
```

The above routines test for the left and right edges of the screen and adjust the row and column values accordingly; although no tests have been given to ensure that the print position stays on the screen. However, the latter tests are very important and should be included during the development of a program; it is sometimes possible to eliminate such tests in the final version, provided you are sure that nothing can make the print position move outside the screen.





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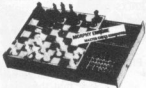
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Circle No. 133

# Graphics



BY GARY MARSHALL

WHEN we can place a shape on a memory-mapped screen by making it up with graphics characters, the next step is to make the shape move round the screen. It is fascinating to make it move in a way that can be controlled by you, the user.

In the better games programs that have been written for the popular microcomputers, a fairly standard arrangement for movement under user control has evolved. It usually involves the use of the numeric keypad, although if a particular micro doesn't possess one, any square block of nine keys can be used.

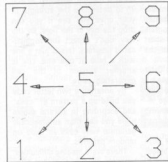


Figure 1: Control keys and directions

The movement control plan is illustrated in Figure 1. The number 5 is central, and is taken to indicate that no movement is required. Since the number 6 is situated to the right of 5, this key is used to indicate that movement to the right is required, and so on with the other keys.

Using the routine given last month to plot a space invader we can write a program to move the invader around the screen. The program should scan the keyboard to see if a control key has been pressed, and if so it should move the invader appropriately.

Thus, if the invader is situated with reference to a screen position, P, and the 6 is pressed, the invader should be moved one place to the right. This can be

done by increasing the reference position by one and plotting the invader again.

Movement to the left can be achieved by subtracting one from the reference position. The changes which have to be made to the reference position for all directions of movement are illustrated in Figure 2 for the Pet, which has 40 character positions in a row.

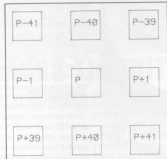


Figure 2: Screen Locations and directions

One refinement is needed, because if an invader, or any other shape, is moved like this, it leaves parts of itself behind so that its movement is characterised by a 'bleeding' which marks its course. To avoid this, the shape can include a surround

consisting of spaces, so that the part left behind is a space and no trail is left.

A Basic program, written for the Pet, to draw an invader and move it round the screen as directed, is shown below.

The program lines have the following functions: line 10 clears the screen and line 20 sets the reference position for the initial plot of the invader.

Lines 30 to 50 plot the invader with reference to P and lines 60 to 110 put the border of spaces around it. Line 120 scans the keyboard until a key is pressed, while lines 130 and 140 reject all depressed keys except control keys. Control only passes to line 150 if a control key is pressed, and lines 150 to 230 move the reference position in response to the depressed key before returning to re-plot the invader in the new position.

Notice that the invader can be driven off the top or bottom of the screen, which is not to be recommended. In fact, a good refinement to the program would prevent it.

Removing lines 60 to 110 converts the program to a rather pretty pattern drawer. The movement scheme gives some insight into how the pieces in many games can be moved.

## GET THINGS MOVING

```
10 PRINT"CLR"
130 C=VAL(C$)
20 P=33268
140 IF C<1 OR C>9 THEN120
30 POKE P-1,255:POKE P,247
150 IF C=1 THEN P=P-39:GOTO30
40 POKE P+1,127:POKE P+39,255
160 IF C=2 THEN P=P+40:GOTO30
50 POKEP+40,249:POKEP+41,127
170 IF C=3 THEN P=P+41:GOTO30
60 POKE P-2,32:POKE P+2,32
180 IF C=4 THEN P=P-1:GOTO30
70 POKE P+38,32: POKE P+42,32
190 IF C=5 THEN 120
80 FORT=P-42TOP-38
200 IF C=6 THEN P=P+1:GOTO30
90 POKE 1,32:NEXT
210 IF C=7 THEN P=P-41:GOTO30
100 FORT=P+78TOP+82
220 IF C=8 THEN P=P-40:GOTO30
110 POKE 1,32:NEXT
230 IF C=9 THEN P=P-39:GOTO30
120 GET C$:IFC$=""THEN120
READY.
```





**GORGON**

Gorgon is a U.S. import and is available through Apple software dealers including SBD Software of Richmond for £18.95.



## X MARKS THE POT

## SNOOKER

Instead of mastering the cue, this game calls for a steady eye in positioning a white cross behind the ball you wish to hit.

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The usual command words apply to this game like: take, get, look, read. As in most other adventure games, using the

Atari's software men come up to scratch in this game with the usual good graphics and colours but it takes a while for a player to grasp that he cannot actually line up his cue with the ball he wants to hit. It costs £19.95 and is available from North London based distributors, Ingersoll.

It costs £17 in cassette form and runs on a 32K Pet. Good Hitch-hiking!



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Circle No. 134

About the only thing the new Atari darts game doesn't have is that familiar T.V. commentator's soaring screech announcing the high score 'Wun-hundred-an-eightyvvv!!'.

The graphics on this game, which runs on the Atari 400 and 800 personal computers, beats most others into a cocked hat. The picture on the screen shows the interior of a pub and it looks convincingly like the local with wooden beams lining the walls and ceilings.

A figure stands on the left hand side of the

For those of you with the good fortune never to have come across a Wumpus, let me inform you that this species of cave dwelling amphibian is absolutely deadly.

The Wumpus inhabiting Texas Instruments' new T.I. 99/4 computer package is pretty typical of the species in this respect.

When you are hunting down his lair you must use all due caution. Should you blunder in on him at home, he will wolf you down without giving you a chance to fire. In fact your only chance of killing a Wumpus is to fire before you see him. Loose an arrow into his cave and you'll live to fight another day — but choose carefully because the Wumpus does not give those who miss a second chance.

A hopeless task it might sound in a massive complex of caves and twisting passages but luckily the Wumpus leaves clues to his whereabouts. In fact every cavern within two of his lair bears the taint of the creature.

But there are other hazards in this complex of caverns. Slime pits for example. These revolting green traps can do for you just as surely as the Wumpus, who — by the way — will wallow quite contentedly in the middle of one of these.

Among the other fauna present is a kind of bat with an extremely good memory. Once you have wandered, however innocently through his roost he will have committed your disturbing of his peace to memory and he will begin to grieve over it.

He works himself up into such a tizzy that next time you enter his cavern he will grab you and deposit you elsewhere.

Experienced Wumpus hunters — very few and far between — will search out the creatures in especially tortuous tunnels. They may attempt to do it very fast or they may even go in blindfold! Foolish people!

Wumpus brings the art of logical deduction to life, with just a pinch of luck as well. The graphics and sound effects are good and the cartridge costs £19.95 from T.J.

picture representing the darts player. His jumper changes colour according to whoever's turn it is.

When the game is in play the darts board itself is clearly marked out at the bottom right hand corner of the screen with the dart throwing hand hovering nearby.

Another ear catching feature of the game are the sound effects. If you throw a dart which hits the wire on the board you hear the realistic chink of metal against metal and then a soft thud as it touches down on the carpet.

And if you miss the board completely but get the wall instead the sound effects are once again spot on, crashing into the wall and dropping to the ground with a clatter.

Kick off play by selecting the type of game you want from 301 to 901 and choosing a skill level to suit you between 0 and 9. Level 6 is about average and a good one to start on. Once you have typed in the player's initials the board appears in close-up on the screen, press start and you're off.

Then you play just like any 'normal' darts game. The computer keeps tabs on the score and flashes it up on the screen after each player has had his go.

But it's not as easy as it looks at first. The hand holding the dart hovers and you have to judge carefully when to fire.

So you have to make sure the finger tip is pointing at the numbered section of the board you want to hit and fire at that exact moment. Like any game involving skill it makes you want to improve your performance and continually beat your opponent. The game is for either one or two players.

At the beginning and end of the game a tune starts to play ... and play ... and play (and good graphics too) ... pleasant to listen to at first but, after a while, it becomes tedious. The programmer concerned must have put a lot of effort into it but perhaps he could have spent his time better.

Darts is available from Britain's Atari distributors, Ingersol for £29.95.



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# DOWN TO BASIC

BY MOIRA NORRIS

## DIVIDING RULES

By experiment you may have already discovered the order in which a computer will perform arithmetic operations when faced with a choice.

In a simple program like:

```
10 PRINT 3+2*5
```

```
20 END
```

the answer would be 13 because, when faced with a choice between multiplication and addition, it will always do the multiplication first.

Similarly, by trying other examples, you would find that it always gives preference to the multiplication and division operators over the addition and subtraction operators.

So  $3+4*6$  gives the answer 7 and  $4*2-3$  gives the answer 5.

What would the answer be in the following case?  $12/6*2$ . Here the computer has a choice between multiplication and division. If the division is done first, then the answer will be 4; if the multiplication is done first, the answer will be 1. Multiplication and division are said to be of "equal precedence", meaning that there is no hard and fast rule as to which one will be done first. In this situation, the rule that is adopted is that the computer works from left to right — so that in this case it would do

the division first; not because it has any natural priority over the multiplication, but because it occurs first as we read the expression from left to right. Addition and subtraction are also of "equal precedence".

As yet, I have not mentioned the exponentiation operation (i.e. working out powers of numbers). Exponentiation has priority over any of the other operations.

```
3**2+5.
```

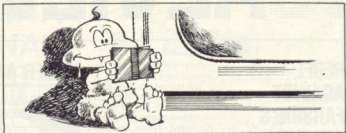
This expression would therefore give the answer 14. (Remember — exponentiation is represented by either "\*\*" or "\*\*".)

At this stage, these rules of precedence may seem very complex, but the important thing at the moment is that you learn to be careful when writing expressions for calculations. Don't worry — if in doubt, try it out and see what happens!

If at any time you wish to override such rules of precedence (or if you are not sure of the rules of precedence), you can use brackets. For example:

```
(3+2)*5
```

will cause the computer to perform the addition first and the final answer will be 25.



## CALCULATING PLUS

You are now in the position that you should be able to write programs to perform any straightforward calculation. You may be asking yourself: "Why use a computer rather than a simple calculator?" One of the features of using a computer is that you can write a program which will perform the specified calculation for any set of values and not just one particular set of values as you have done until now.

To illustrate this, I will return to the simplest of examples — a program to add two numbers. This time, I will write a program that will add any two numbers — these numbers will be provided when the program is RUN.

```
10 INPUT A,B
20 PRINT A+B
30 END
```

This program uses "variables" A and B to describe the calculation to be performed on the numbers.

If you RUN this program, the computer will wait for you to type the values of A and B when it encounters the "INPUT" instruction. It will print the prompt "?" so that you will know that it is waiting for "input". You then type in the required values, separated by commas if there is more than one, then press the "Return" key. Therefore, for the above program you should have something that looks like:

```
"? 3,2" printed by the computer.
```

In this example, I used the names A and B to represent the two values. As these are only "dummies" to allow us to des-

3+2\*5?





cribe the operations the computer has to perform, it is not significant that I used these particular names. Some versions of basic restrict you to names consisting of a single letter or a single letter followed by one of the digits 0,1,2,3,...9. The following are examples of names that could be used: A, X, Y2, T9.

Other versions can cope with longer names for variables. This means that you can have more meaningful names such as "PROFIT" or "VALUE 66". Note that I have always written my programs in uppercase letters.

Again, many systems are more flexible and permit lowercase and uppercase letters. I shall always use the more restricted forms as my programs should then work, as they are given, on the majority of systems.

## REPEAT FIVE TIMES

Another powerful feature of computers is that it is easy to repeat calculations. It is no more difficult to write a program to

repeat a calculation a thousand times than it is to write one to repeat it five times.

The programs I have looked at so far have been of the form  
INPUT data  
PRINT answer to calculation on data

Now let's look at examples where these instructions are repeated a given number of times. For example, I might have a program of the form:

```
Repeat five times
INPUT data
PRINT answer to calculation on data
end of repeat
```

I have used a "loop". In this example, I "loop" five times — meaning that I loop back and repeat the instructions five times. To illustrate how you can write a program to do this, I'll write a program to add, not one pair of numbers, but five pairs of numbers.

```
10 FOR I=1 TO 5
20 INPUT A,B
30 PRINT A+B
40 NEXT I
50 END
```

Two new instructions have

been introduced — the FOR statement and the NEXT statement. These will be discussed in more detail next month. For now, it suffices to say that they bracket the instructions to be repeated, and that the variable called "I" acts as a count of the number of times round the loop.

## MESSAGES IN QUOTES

The PRINT instructions used so far have been used to print the answer to a calculation. PRINT instructions can also be used to print messages. To do this you simply enclose the message that you want printed in quotes. A simple program to illustrate this is:

```
10 PRINT "THIS IS A TEST"
20 END
```

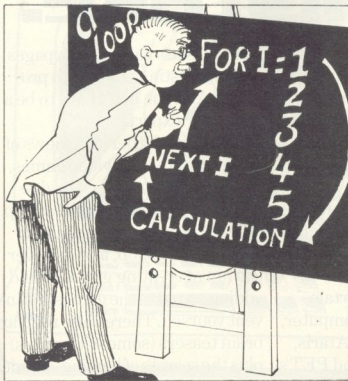
I will leave you with the following example program. It includes loops and the use of the PRINT instruction to print messages. Try running this program and then see if you can work out what each instruction does. I will go through it in detail next month.

```
10 FOR I=1 TO 2
20 FOR J=1 TO 4
30 PRINT "XXXX" XXXX
40 NEXT J
50 FOR K=1 TO 4
60 PRINT "XXXX XXXX"
70 NEXT K
80 NEXT I
90 END
```

## NEXT ISSUE

Most computer games involve graphic symbols — these are the building blocks used for drawing pictures on the screen. Many of the versions of Basic developed for microprocessor systems include special instructions for graphics. The more specialised instructions will be dealt with later in the series. Next month, I will describe how you can achieve simple graphical displays using the PRINT instruction.

## NEXT ISSUE





# **“My finger slipped, I hit the button, and nuked Washington by mistake.”**

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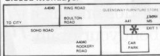
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# SOFTWARE GLOSSARY

*A beginner's guide to plain jargon*

**ALGORITHM** A process or set of rules to carry out a task or solve a mathematical problem.

**ARRAY** A series of items (data or information) arranged to form a meaningful pattern.

**ARRAY SUBSCRIPT** An indexing notation e.g. X(1), X(2) where 1 and 2 are subscripts, used in an array.

**BITS** Binary digits. The 0s and 1s that make up the binary code computers understand.

**BUG** A slang term given to a mistake in a computer program which prevents it working. It can refer to a mechanical, electrical or electronic defect in a computer.

**BYTE** A term to measure a number of bits (binary digits), usually eight bits to a byte.

**CHIP** A tiny piece of silicon which holds all the components that make up a microprocessor.

**CHARACTER STRING** A sequence of characters in a row.

**CONCATENATE** To unite in a series, link together or chain.

**CURSOR** A small square-shaped mark which indicates where a character will appear on the screen. It can be moved around the screen using certain keys on the keyboard.

**DECODE** To interpret and determine meaning, and to translate a code into more understandable form.

**ELECTROLYTIC CAPACITOR** A component which allows the passage of AC current but not DC current.

**ELLIPTICAL** Of or relating to an ellipse or ellipsis.

**ELLIPSIS/ELLIPSE** Omission from sentence of words needed to complete construction or sense.

**ERRATA** (Erratum) Errors in printing or writing, usually in lists.

**EXPONENTIATION** A mathematical operation used to calculate powers of numbers.

**FOR... NEXT** A Basic statement which is an instruction used for repetition of a sequence of program statements (see loop).

**GOSUB** A Basic command instructing the computer to go to a subroutine in a computer program.

**GOTO** A Basic command which tells the computer to jump to another line in a computer program.

**GRAPHICS CHARACTERS** The name given to pictorial representation of data such as plotted graphs, engineering drawings and computer games.

**HARDWARE** A general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

**INPUT** Information which is fed into the computer.

**INTEGER** A number which does not contain a decimal point, i.e. a whole number.

**K** Abbreviation for Kilobyte.

**KILOBYTE** A measurement of memory capacity. 1024 bytes of memory. So 8K is equivalent to 8192 bytes.

**L.E.D. (Light Emitting Diode)** Provides a simple display and consists of an electron tube which lights up when electricity is passed through it. Used as an alternative to liquid crystal displays in calculators and watches.

**LET** A Basic statement which defines a variable. E.g. LET A=0.

# SOFTWARE GLOSSARY

A beginner's guide to plain jargon

**LOGICAL NETWORK** A series of interconnected points linked by communications facilities.

**LOOP** A Basic function referring to the repeated execution of a series of instructions for a fixed number of times.

**MEMORY** A measurement of how much information a computer can cope with.

**MEMORY MAPPED SCREEN** Data called up on the V.D.U. screen to help when processing scattered program fragments in the computer's memory.

**MESSAGE** A sequence of letters or symbols which has some sort of meaning.

**NEXT** (See FOR . . . NEXT).

throwing a dice these numbers are useful in games.

**ROM (Read Only Memory)** A memory chip which can only be read from and not written into.

**ROUTINE** A set of coded computer instructions used for a particular function in a program.

**SCAN** To examine stored information for a specific purpose as for content or for arrangement.

**SOFTWARE** The programs fed into a computer, which make them perform what we want them to do.

**STRING** A connected sequence of characters, words or other elements usually symbolised with the \$ (dollar) sign.



**OSCILLATE** To undergo high-frequency alternations as across a spark gap or in a valve transmitter circuit.

**POKE** An instruction used in most versions of Basic allowing you to store integers in a specific place in memory.

**PRINT** A Basic command which tells the computer to perform a calculation in a program.

**PROCESSING** Handling and manipulating computer data.

**RAM (Random Access Memory)** This is a number that can only be repeated by chance. As it is like

**SUBROUTINE** A computer program routine that is translated separately, generally used in several computer programs or several times in one program.

**TERNARY** Relates to the number system of the base three.

**USER PORT** The entry channel which a data set is attached to.

**VALUE** The numerical quantity of a data element, and is the number assigned to a variable.

**VARIABLE** A symbol whose numerical value can be changed at all times. It is used when writing programs.

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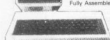
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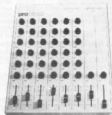
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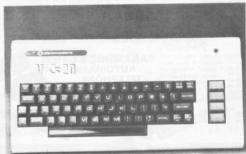
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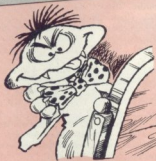
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**SINCLAIR** There are two types of Sinclair microcomputer available for under £100. Sinclair really brought the microcomputer into the home. The machines are ideal for learning the rudiments of computing but are limiting graphically. The ZX80 has 1K of memory and is no longer in production. The ZX81 sells for £49.95 for 1K in kit form. The 16K RAM packs cost £49.95.

**SORCERER** The Exidy Sorcerer is a home computer with a sizeable games following but it is one of the more expensive of the microcomputers, costing upwards of £749. Memory amount ranges from 48K to 55K and there is a plug-in ROM pack for extra capacity. Disc drives and visual display unit are an additional cost. Sorcerer's can be obtained from a Cornish firm, Liveport of St Ives.



**TANDY TRS-80** Tandy's TRS-80 Model 1 is a machine which is often used for games and is well-supplied with software for both entertainment and business applications. Its memory capacity goes from 4K to 16K but there is an expansion unit available upgrading it to 48K if you want the extra memory. The Model 1 is the cheapest of the Tandy range.

The Model 1 costs £459 but comes complete with a monitor to use as a VDU and a cassette. The Model III is an integral unit made up of a keyboard, 12 inch screen and two slots for 5 1/4" discs and has a printer interface. It costs from £499.

**TANGERINE** Tangerine Computer Systems produces the Microtan 85, a microcomputer for games and personal use like household accounts. It comes in kit form and is expandable from an initial 1K memory up to 48K of RAM. The Microtan 85 costs £79.35 for the 1K kit, or £90.85 assembled. Tangerine is based in Ely, Cambridgeshire.

**TI-99/4** This computer has recently been re-launched by Texas Instruments. It consists of a separate keyboard with graphics facilities in full colour and now plugs into a UK television. Software available for it from Texas Instruments is mostly business and educational but the firm has recently introduced a bundle of games to run on the computer. It has 16K RAM and uses tapes, discs or plug in games cartridges. You can buy one of these from T.I. itself or through some of the high street retailers like Rumbelows for £299.

**VIC-20** The VIC is the much publicised baby of the range of microcomputers from Commodore of Slough. At £185 it is one of the

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**VIDEO GENIE** The Genie is made by E.A.C.A. and is a popular games machine. It is compatible with the Tandy TRS-80 Model 1. With 16K to 48K RAM there are disc drives available. The basic unit costs from £369 and is available from Lowe Electronics of Matlock in Derbyshire.

**U.K.101** This machine comes in either kit form or ready built with memory capacity of 4K to 40K (with an expansion board). It contains television and cassette interfaces so you don't need a V.D.U. The U.K.101 is a popular computer for playing games and there is a lot of software around for it. The kit costs £149 for 4K, ready built, it sells for £199.

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